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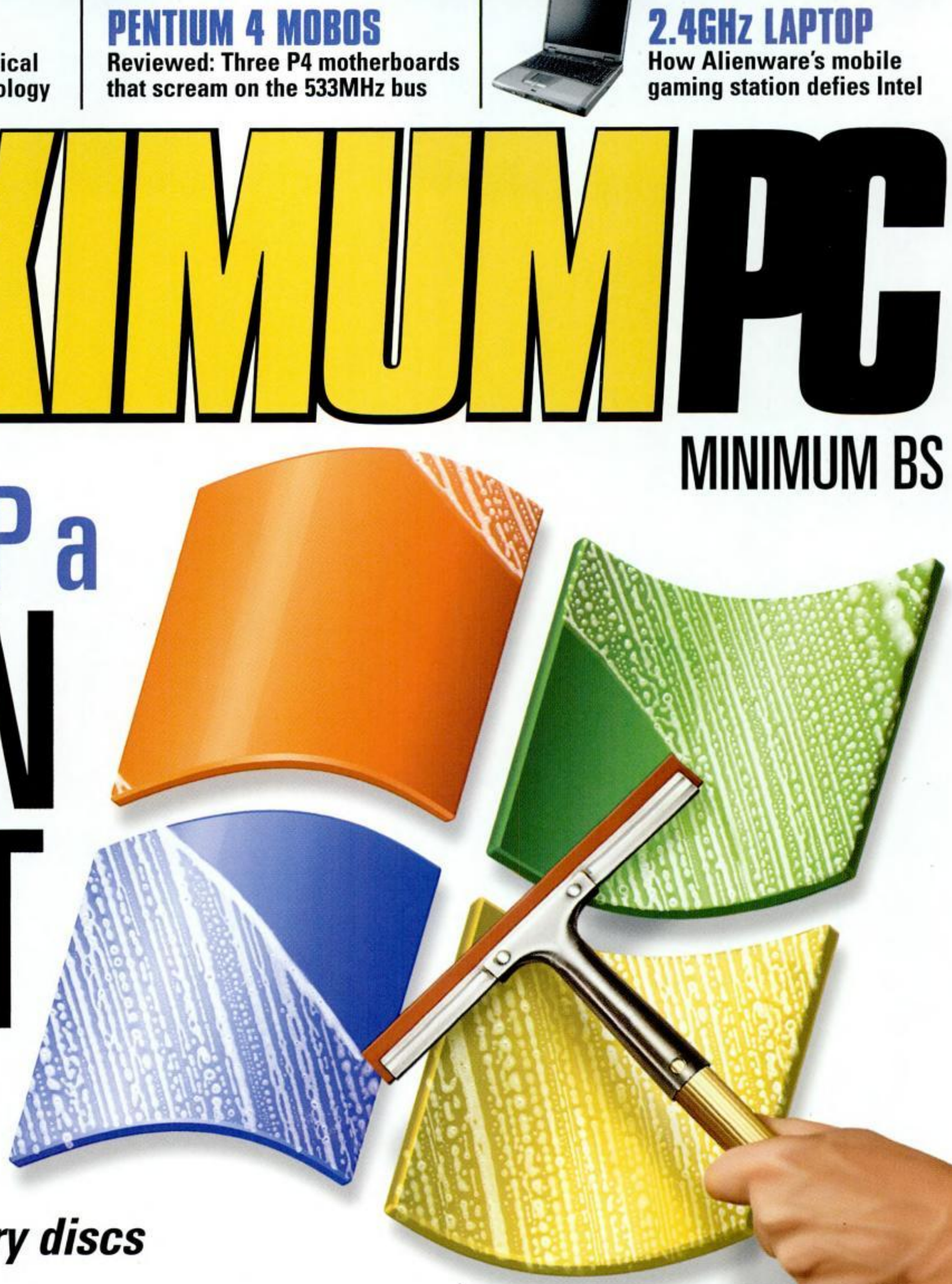

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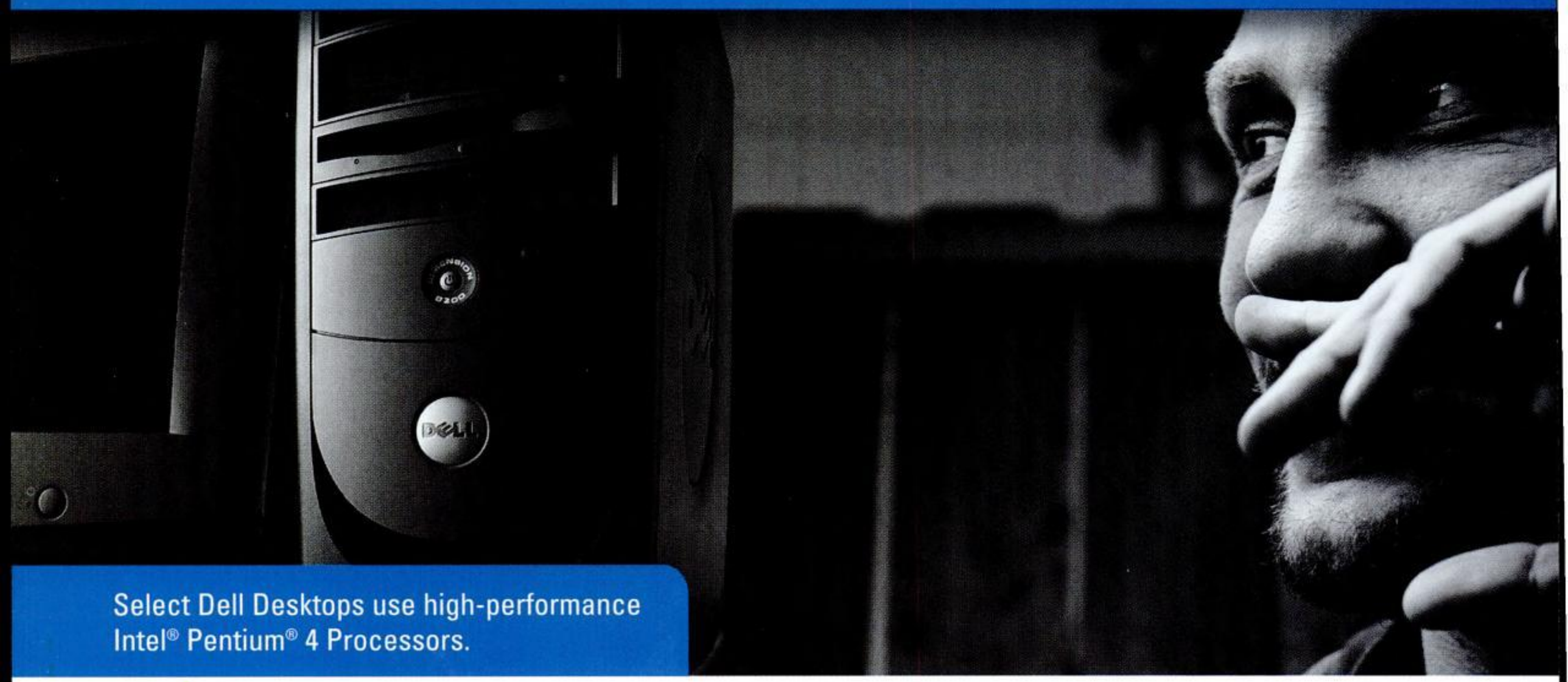

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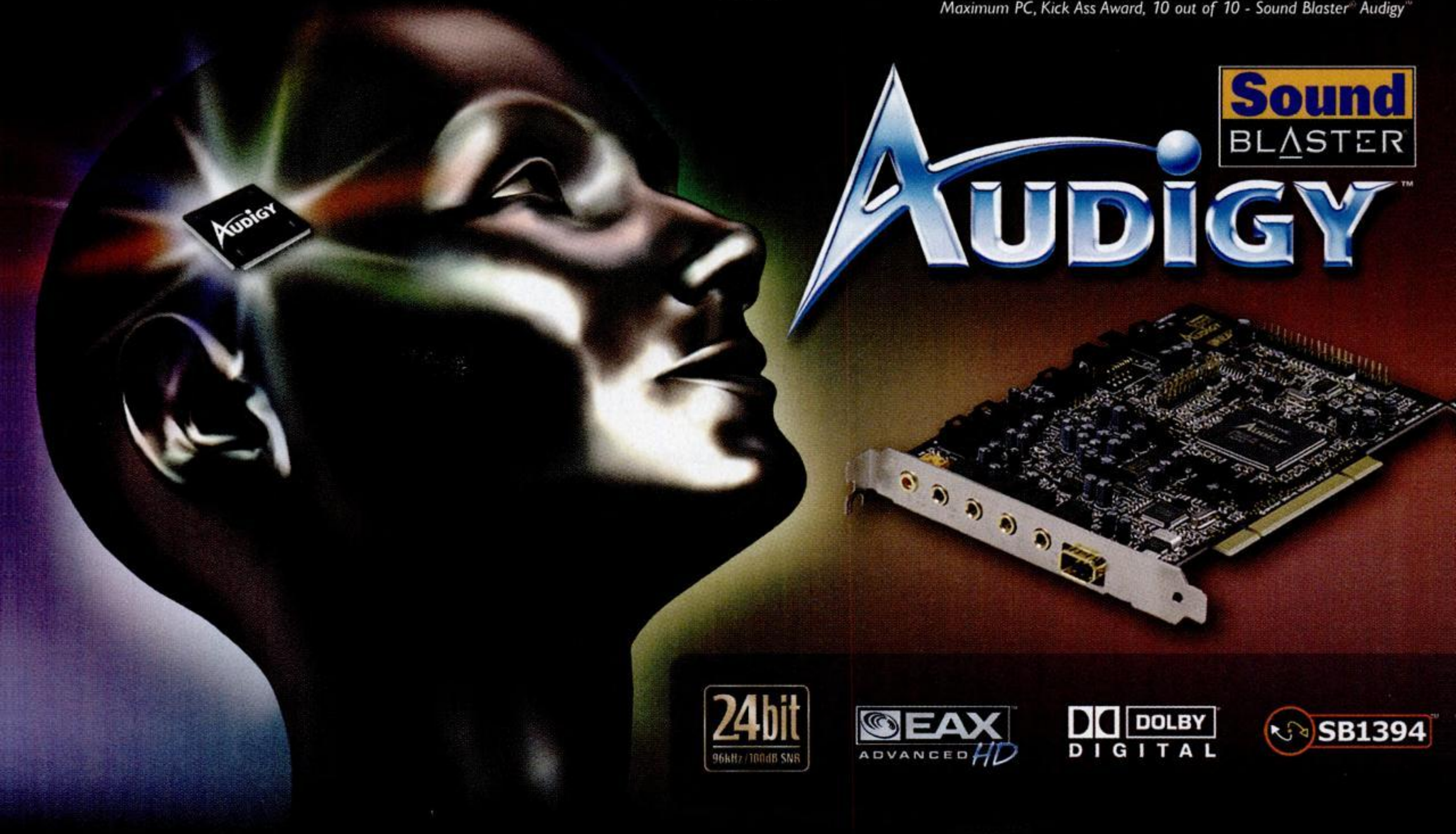

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Release Notes

Stop me before I car-jack again

As I write this, the day is June 19—the final day of John Tumminaro's stint as a *Maximum PC* intern. I don't usually use this space to say goodbye to departing staff members, but our Lil'est Intern is a special case, a guy who started as someone who was just supposed to clean the Lab, and ended up the author of a *Maximum PC* cover story. John is most certainly driven by an innate can-do spirit, but I think it was his long-standing passion for the magazine that made him such a good intern. You just can't fake or finesse an interest in the topics we cover. To be a good *Maximum PC* contributor, the enthusiasm must come from within.

And in other news...

■ We want to know what hardcore gamers think of recent developments in the 3D hardware scene. Based on what you already know about the Matrox Parhelia, are your thumbs up or down? Same goes for the 3Dlabs P10—thumbs up or thumbs down? Are you willing to buy a videocard that sacrifices frame rate performance for bold new features? Send your comments to input@maximumpc.com, and explain your motivations.

■ And while we're on the subject of e-mail addresses, let's get this one straight: If you have any questions about your *Maximum PC* subscription, you should send them to maxcustserv@cdsfulfillment.com. *This is the only appropriate address for service issues*. If I get one more subscription complaint in my personal in-box, I'm going to forward it to "Olufemi Kenneth Ige," the deposed Nigerian plutocrat who keeps spamming me with pleas to assist him with the "transfer of some money."

■ Finally, despite Will Smith's ringing endorsement on page 76, I have to call bunk on *Grand Theft Auto 3*. The game is deep, sure, but it's also relatively boring. During a three-hour marathon, I beat to death about 30 civilians, destroyed some 20-odd cars, and caused about $280,000 worth of property damage. I also raised the murderous wrath of every single ethnic street gang in Liberty City, and after five or six completed missions, I *still* left the game feeling I hadn't accomplished anything. All of which goes to prove that the life of a sociopath isn't patently more interesting than the life of a ho-hum PC geek.

—JON PHILLIPS

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Chris Lesemann, Thomas McDonald

CONTRIBUTING ILLUSTRATORS
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Lawrence Briseno PRODUCTION COORDINATOR

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150 North Hill Dr. Brisbane, CA 94005
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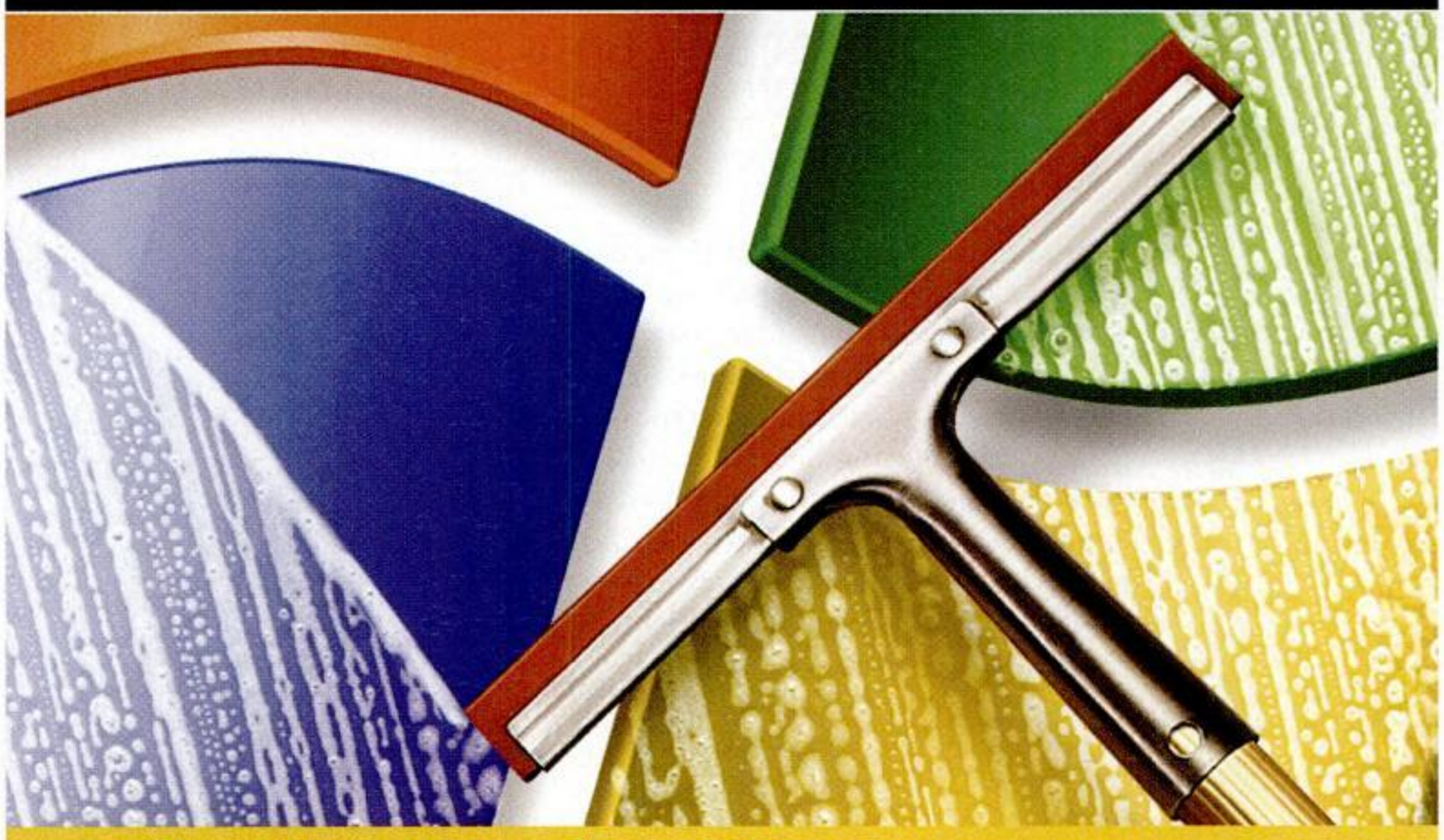

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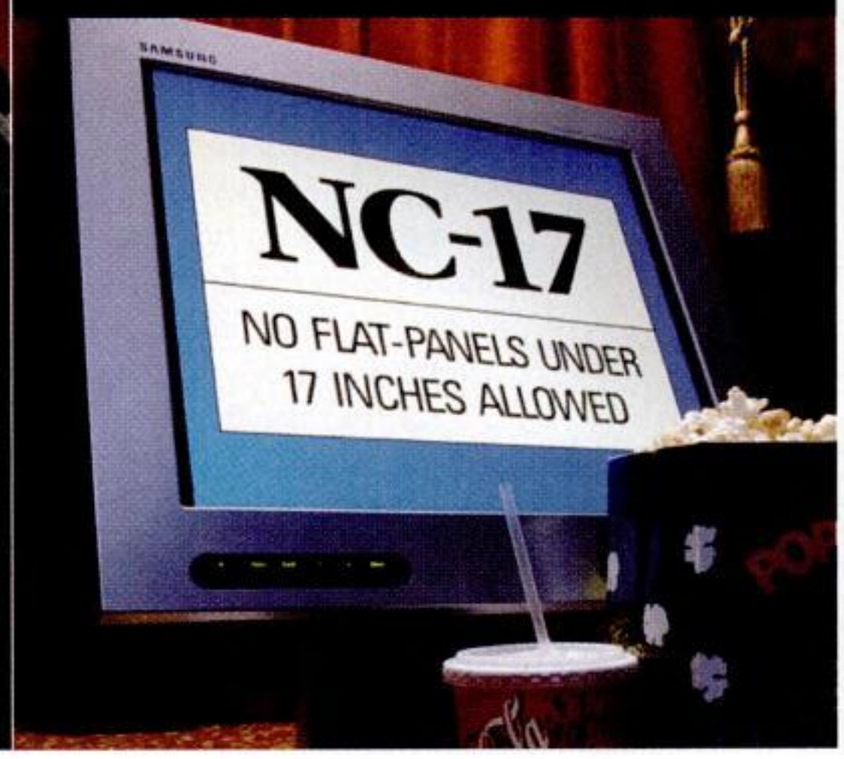

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In/Out

You write, we respond

Who Are These People and What Do They Have to do with PCs?

No readers sent us any funny pictures this month, so we asked Jon to peel through his e-mail Attachments folder for bizarre PR photos. If anyone can explain why Yankees manager Joe Torre and former football great Boomer Esiason are posing with computer-related businessmen, please write input@maximumpc.com. It's too late for Jon to provide an explanation, because he already deleted the original e-mail that contained the attachment!

DO THE VOODOO5 6000 SOME JUSTICE!

I was quite intrigued by your 3dfx reviews ["Last Days of 3dfx," June 2002]. The Voodoo5 6000's *3DMark2001* score of 9.3fps seems unusually dismal. My TNT2 M64 (yeah, shut up!) does better than that. Which drivers did you use? What was the configuration of the test system? Did you know that there are open-source hacked drivers out there that work far better with the V5 6000 than does 3dfx's last gasp of air, which was never optimized for the V5 6000 in the first place? Is there any chance we might see a full-blown review of the Voodoo5?

—CANUCKLEHEAD

We won't devote valuable review pages to a product that most of our readers would be unable to buy...

TECHNICAL EDITOR WILL SMITH RESPONDS: First off, please remember that our June issue 3dfx story was an "historical interpretation," and not a review, so our benchmark numbers should not be interpreted as the gospel.

We used the drivers that were provided with the board, which seemed to be DirectX 7 drivers. Unfortunately, the hacked drivers that we tested for the article consisted mainly of the old drivers with modified version numbers.

The board was tested with a 1.1GHz Duron. Unfortunately, the Voodoo5 6000 is a 5.5V AGP part, so, like its younger sibling, the Voodoo5 5500, it can't work with any Intel chipsets developed since the i820, including the 850 in our current reference point system.

In the time since we benchmarked the board for the article, several "real" hacked drivers have shown up online. Regardless, we won't devote valuable review pages to a product that most of our readers would be unable to buy, and isn't even supported by the original manufacturer today.

I'LL TAKE PCI CARDS, THANK YOU

Your excellent review of motherboards in the June issue was most appreciated, as I am planning to assemble my own high-quality desktop system during the next few weeks. I must, however, disagree with your criticism of motherboards that don't include onboard Ethernet, audio, and RAID. Personally, I would like a motherboard to be as modular and upgradeable as possible. Ideally, even hard- and floppy-disk controllers and ports should be via PCI cards. How does the manufacturer know if I want IDE or SCSI, or whether I intend to have 5.1 or 2.1 channel sound? Down the road, Gigabit Ethernet may become affordable on the desktop.

Admittedly, a reliance upon add-on PCI cards tends to be a somewhat more expensive way to go, but it, (1) maximizes the consumer's options, (2) protects against obsolescence, and (3) eliminates the hassle of having a soldered-on component fail, rather than an easily replaceable PCI card. Unfortunately, Intel's forthcoming 850G chipset—which will be aimed at lower-end business desktops—is even going back to the lousy idea of onboard video!

—SCOTT OCHILTREE

SENIOR EDITOR GORDON MAH UNG RESPONDS: Your point is well taken. We have long believed in the ability to upgrade graphics, audio, and other I/O through add-in cards as technology marches on. However, there are two problems with your argument. First, what if you're faced with a motherboard offering onboard RAID, Ethernet, and USB 2.0 that costs just $25 more than the bare-bones board? Any of the onboard components can be disabled if one fails or should you decided to upgrade. You lose little but gain much more, as you'd be hard-pressed to buy a NIC, RAID, and USB

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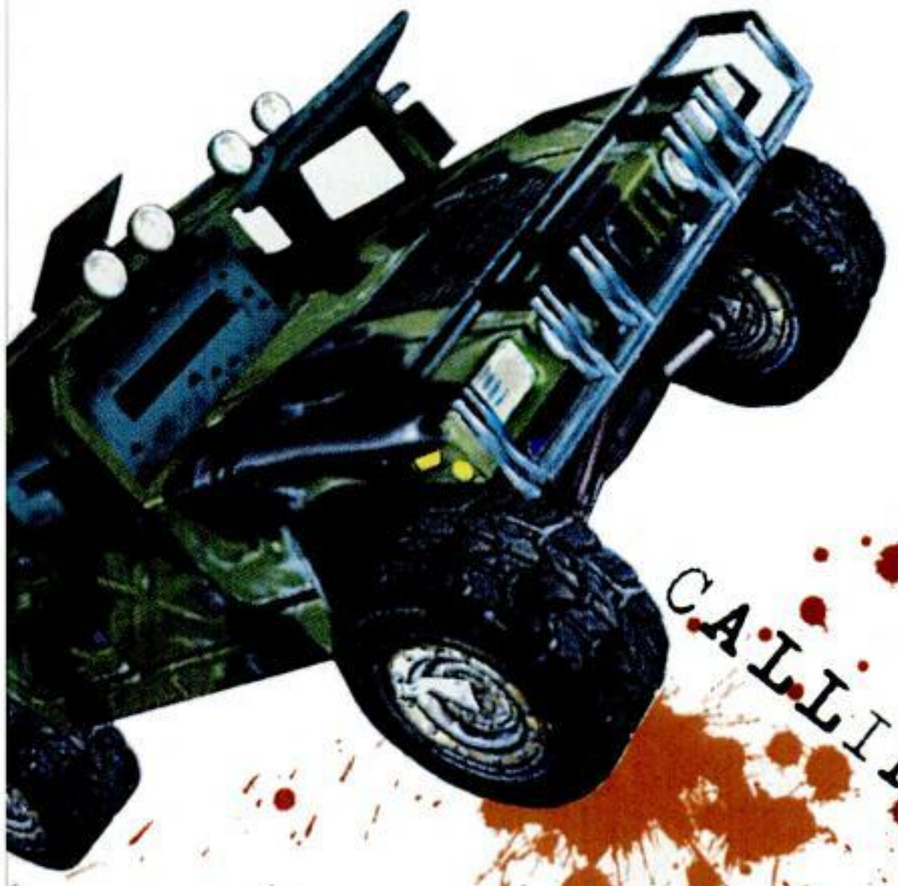

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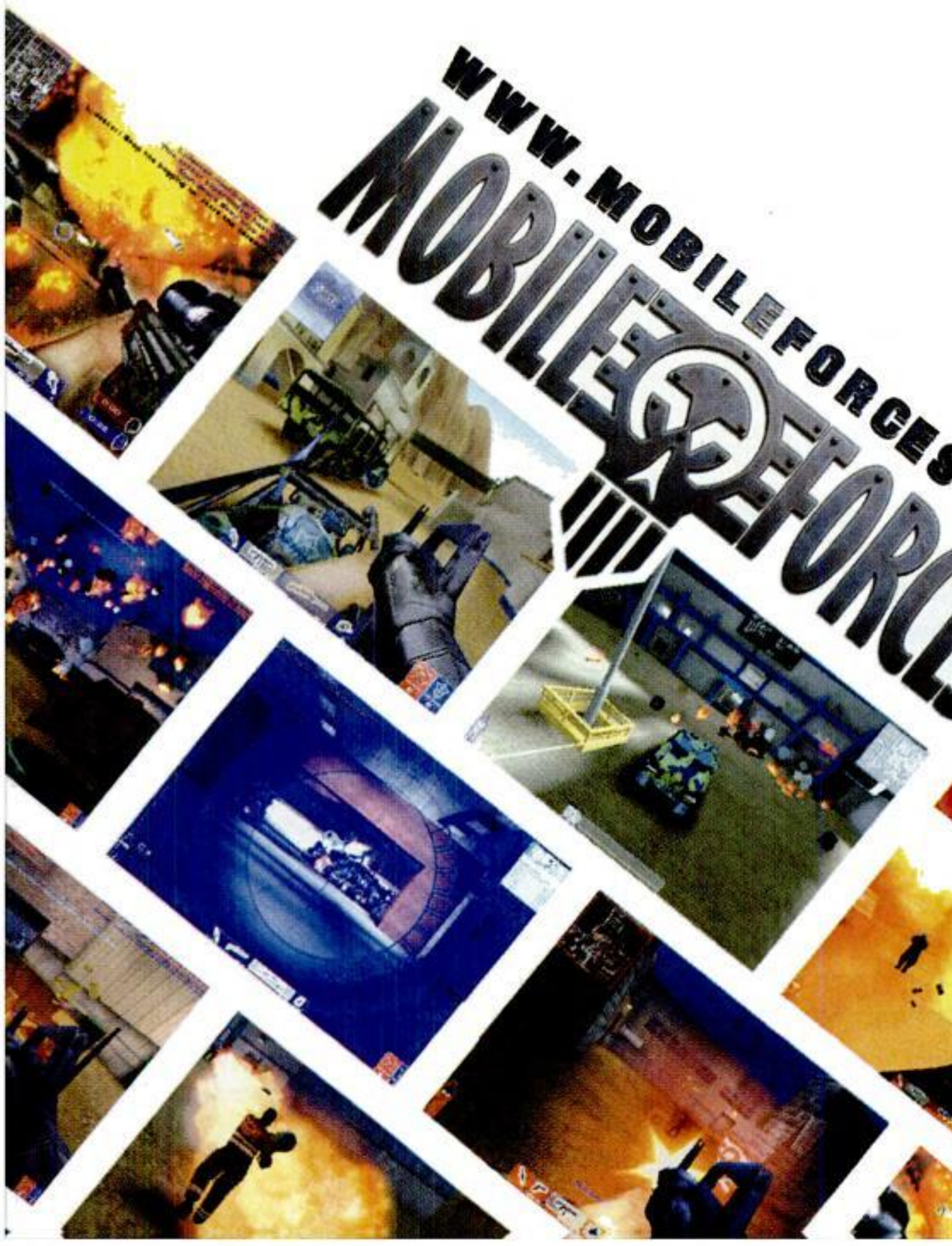

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COMING NEXT MONTH

IN THE SEPTEMBER ISSUE OF MAXIMUM PC

Dream Machine 2002

Hand-built with loving care, it's the best desktop PC ever! Follow along as our team of experts specs out the ultimate dream rig, part by killer part. The machine's performance more than exceeds the sum total of all its components, so you'll definitely want all the juicy details. And the paint job is a work of art!

Lean Machine 2002

Hey, not everyone has a bottomless budget, so we'll also show you what goes into the ultimate affordable PC. Dollar for dollar, it's every bit as good as its more expensive older brother.

Workstation Warfare

Why buy a dedicated workstation videocard? You'll find out next month when we introduce you to three audacious boards intended for high-end 3D development.

Next-Gen Buses

3GIO. Serial ATA. Hyper Transport II. Serial AGP. Infinband. FireWire B. PCI-X. Stay tuned for a sneak peak at all the screaming-fast bus technologies that are threatening to make your current motherboard obsolete.

2.0 card for $25 total. Second, you should also consider that an onboard component may actually offer *better* performance than an add-in card. If the component is integrated into the southbridge, it bypasses the PCI bus, which can result in a small performance boost.

MINI-DISSED

In your July Head2Head, you failed to mention the one feature of the MiniDisc that gives it an advantage over other media types: It's totally editable. You can move tracks around with ease, and combine them or delete them altogether without having to go through a long process. Just tell the disc you want the song gone, and it's gone. Want to replace a song with one you like more? Not a problem. Plus you can re-record on the discs, supposedly up to a million times. You can't do that with a CD-R. And MiniDiscs are a lot more resistant to damage. Oh, and another thing—the picture you show is of an old MZ-R50! Where did you dig up that relic? It came out in 1997. The new recorder/players are only around three inches square.

—SCOTT CARPENTER

I'm outraged with the comparison you made to MiniDiscs. You pictured all top-of-the-line or new equipment for everything except the Sony MiniDisc unit. The unit you showed is at least five years old, probably more. You mentioned that MiniDics hold just 60–74 minutes. They haven't held that little since three years ago. The players now record and play up to 350 minutes on the same discs that held just 70–80 minutes. I'm very disappointed with the poor quality of this article.

—MIKE SMITH

FEATURES EDITOR LOGAN DECKER REMONSTRATES: We were apprehensive about using the MZ-R50 as an example of a MiniDisc player, but we were unable to locate a single manufacturer—not Sony, not Panasonic, nor any of the others—that was willing to send a current demo unit. In fact, they seemed completely uninterested in the format themselves!

Not only did Sony refuse to send us a classic MD player or recorder for photography, but when we asked about reviewing one of its new NetMD units, we received an extremely curt response saying units weren't available—even though we had seen working demo units last year at CES. So we used the model we had in the Lab. Not as a testing unit, mind you, but just for photographic purposes.

It's true that disc capacity on MiniDiscs can be dramatically extended by raising the compression level (and thus lowering audio quality), but we compared formats using what we considered to be equivalent quality settings. Now that we've had a chance to check out the NetMD player (in our review of the Sony VAIO PCV-MXS20, July 2002), we think it's definitely an improvement to the format. But MD still doesn't have anyone doing a jig in the Lab.

ARE ALL TI 4600S CLONES OF THE SAME CARD?

OK, who makes this stuff anyway? I'm talking about GeForce4 Ti 4600 cards.

"What gives? Who has the cookie cutter? Is someone out there actually making this stuff on a dough press and re-branding?"

I built my God-Box with all the latest, hottest hardware anyone could imagine, including a GeForce4 Ti 4600. I bought the MSI-branded card with the video-in/video-out chips. At $326, it was a steal compared with the Visiontek, which cost $399.

Except for their PCB colors, the Visiontek, PNY, MSI, Chaintech, Gainward, Prolink, Procolor, and eVGA GeForce4 cards have exactly the same—not just similar—board design. Same chips in the same places, same jumper pads and empty sections for future expansion, and most likely the same capacitors. What gives? Who has the cookie cutter? Is someone out there actually making this stuff on a dough press and re-branding? Also, if it's the same hardware, it would require the same drivers regardless of the brand! Not that I'm complaining. I love my card! It works even better than I expected, and the bundled software is killer. I'm just curious.

—ADRIAN CRISCI

TECHNICAL EDITOR WILL SMITH RESPONDS: We've been complaining about the homogeneity of 3D accelerators for the past two years. Since the GeForce2 launch, almost all the boards using nVidia chips have been spec'd with just minor variations, such as the discretionary inclusion of DVI or S-video outputs. Aside from these slight differences, all the companies use the same reference board, same speed core and memory, and same drivers.

Most OEMs create GeForce boards using the same reference board design provided by nVidia, but some, like Gainward, are tacking extra features onto their boards, such as FireWire ports.

As for the drivers, you can download refer-

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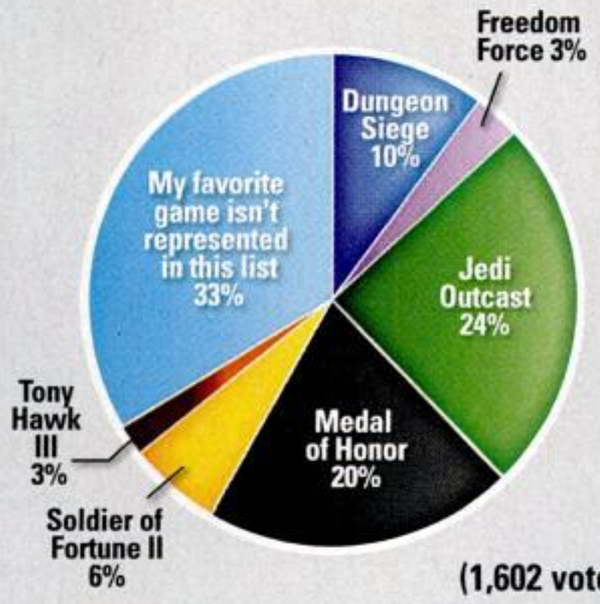
MAXIMUM PC's

READER PULSE POLLS

Your vote counts!

Please contribute to our reader polls at www.maximumpc.com.

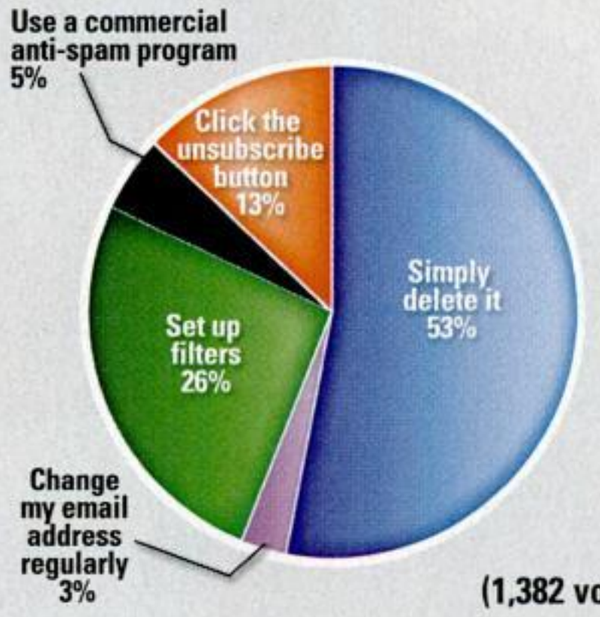
What is your favorite game of the year so far?


Freedom Force 3%
Dungeon Siege 10%
My favorite game isn't represented in this list 33%
Jedi Outcast 24%
Tony Hawk III 3%
Medal of Honor 20%
Soldier of Fortune II 6%

(1,602 votes)

We picked our favorite games of the year so far, but the readers apparently don't have the same taste in interactive entertainment. Still, more than 40 percent of our respondents reported Medal of Honor or Jedi Outcast as their favorite game of 2002. It's still a first-person shooter world.

What do you do to combat spam?


Use a commercial anti-spam program 5%
Click the unsubscribe button 13%
Simply delete it 53%
Set up filters 26%
Change my email address regularly 3%

(1,382 votes)

Beware: Clicking the Unsubscribe button just lets the spammers know they stumbled upon a valid address, which will almost always result in a deluge of worthless e-mails. Filtering and deleting unwanted mail is really the only way to go right now, although we're starting to see some well-developed commercial filtering apps. Stay tuned for upcoming reviews!

ence drivers for most nVidia boards from www.nvidia.com. Elsa used to offer customized drivers, but ever since the company stopped making consumer boards, we haven't seen any difference between third-party drivers. Today, companies like MSI just bundle rebranded reference drivers, nothing more.

DON'T FIGHT THE POWER

The *Maximum PC* July 2001 "Wild Cards" feature inspired me to purchase a new graphics card. I have a Gateway Performance 750 with all the qualifications that were listed for Visiontek's GeForce3 Ti 200 card. It was an easy install for a non-geekster like me, but I ended up with poor results. I removed the card and reinstalled the TNT M64 card. After reviewing a million pages from graphics card manufactures, I found in a FAQ at Visiontek's site that its graphics cards will not operate correctly if the power supply cannot deliver at least 250 watts. My question is, How many of us non-experts are muddling along on 200 watts on a fairly recent machine unable to run any of these new cards? *Maximum PC* did not mention the power requirements, nor do any of the card manufacturers on their packaging.

—DENNIS R. WALKER

TECHNICAL EDITOR WILL SMITH RESPONDS: Real power users have power supplies that are 300W or higher. You simply shouldn't accept anything less. To tell you the truth, we don't get a whole lot of e-mail from people having power supply problems these days, so we figure those issues went out of style with the classic Athlon. Regardless, upgrading your power is a fairly simple procedure if your Gateway PC shipped with a standard ATX power supply.

SHUTTLE SCUTTLEBUTT

I just wanted to let you know that the review of the Shuttle SS50 system in the June 2002 issue incorrectly states that the SS50 "lacks an AGP slot, so you can't upgrade to better graphics!" While it does lack an AGP slot, the video can still be upgraded significantly. I installed a PCI-based GeForce4 MX420 into my SS50 and have gotten solid results, scoring a *3DMark2001 SE* score of 3442 with the benchmark defaults (1024x768, 32-bit, pure hardware T&L). I might also mention that I'm running an almost identical configuration to that of the SS50 featured in the review (Pentium 4 1.8a, 512MB Crucial DDR PC2700, Western Digital 100GB hard drive).

Although the results are understandably far inferior to those of the GeForce3 Ti 500 used in the i850 reference machine for comparison, the addition of the GeForce4 MX420 for $75 makes the SS50 an even more appealing buy than it already is. I think it would be fair to Shuttle to note this.

—ROBERT OSBORNE

LIL'EST INTERN JOHN TUMMINARO REPLIES: While it's true that you can "upgrade" the graphics of the SS50 via one of the PCI slots, this really isn't a solution we can endorse. Although we have yet to see games make use of AGP texturing, a modern graphics card requires the extra bandwidth that AGP offers, in our opinion. Using PCI for graphics creates a serious bottleneck that keeps your card from living up to its full potential.

Also, while it's true that you can get a GeForce4 class videocard in a PCI configuration, the GeForce4 MX420 offers the absolute lowest performance of the GeForce4 line, being hobbled with 2.8GB/sec of memory bandwidth courtesy of its SDRAM. Bottom line: Although you can upgrade the SS50 as you mentioned, we can't recommend such a kludge solution. However, there is some good news. Recently at Computex, Shuttle demonstrated its next generation of bare-bones systems with… an AGP slot! ■

LETTERS POLICY: ***MAXIMUM PC*** invites your thoughts and comments. Send them to **input@maximumpc.com**. Please include your full name, town, and telephone number, and limit your letter to 300 words. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.

CUT, COPY, PASTE

In the Memory portion of May's upgrading feature we used the term PC333 when we actually meant DDR333.

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delivery charges, and other related purchase expenses are not included in this monthly payment amount. The number of months you will pay and the amount of your total minimum payment due will depend on additional purchases and your Account balances. [1]For hard drives, GB=billion bytes. [2]16X DVD-ROM drives read a minimum of 5545 Kbps and a maximum of 21640 Kbps. [3]ITU V.90 modems are designed only to allow faster downloads from K56flex- or V.90-compliant digital sources. Maximum achievable download transmission rates are currently unknown, may not reach 56 Kbps, and will vary with line conditions. [4]24X CD-RW drive data transfer rates may vary as follows: for recording to CD-R media, the max transfer rate may be up to 3600 Kbps (use 24X discs for best performance); for writing to CD-RW media, the max transfer rate may be up to 1500 Kbps (use 4–10X high-speed media discs for best performance); for reading CD media, the max transfer rate may be up to 6000 Kbps. Actual transfer rates may vary depending on media quality. [5]48X Max CD-ROM data transfer rates may vary from 2500 to 7200 Kbps. [6]8X DVD-ROM drives read a minimum of 4463 Kbps and a maximum of 10820 Kbps. [7]24X Max CD-ROM data transfer rates may vary from 1500 to 3600 Kbps. **Interface based on industry standard USB supporting 802.11b or Bluetooth. See www.compaq.com/products/wireless for more information. Microsoft® Windows® XP Home Edition installed. Compaq, the Compaq Logo, and Presario are trademarks of Compaq Information Technologies Group, L.P. in the U.S. and other countries. Intel, the Intel Inside Logo, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the U.S. and other countries. Microsoft, MS, and Windows are registered trademarks of Microsoft Corporation. Products and company names mentioned herein may be trademarks and/or registered trademarks of other companies. ©Copyright 2002 Compaq Information Technologies Group, L.P. 200010/08/02

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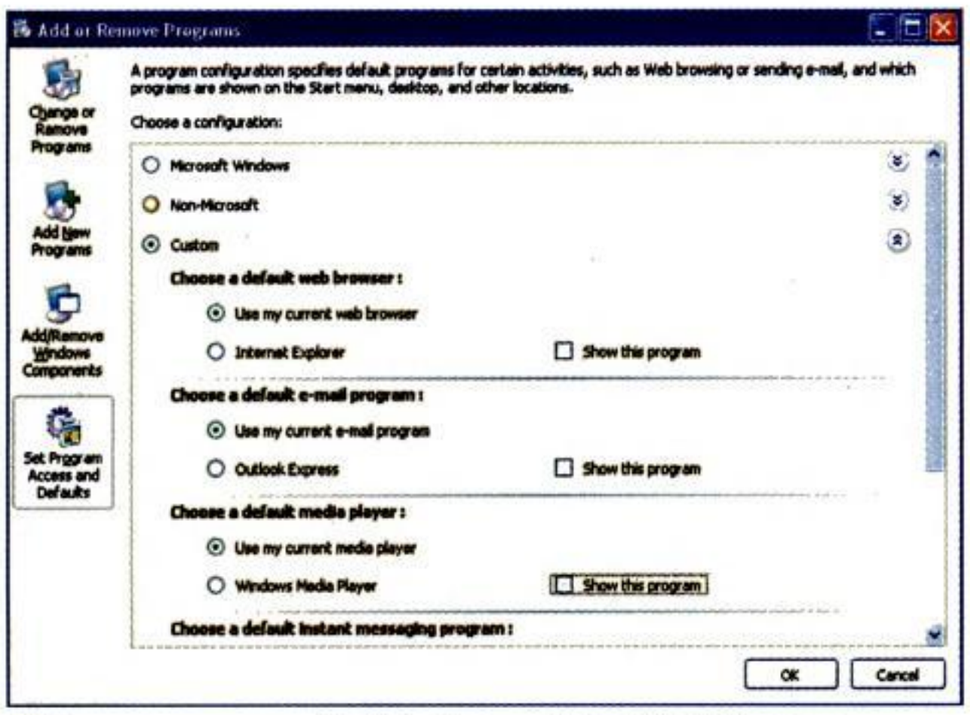
Quick Start

The beginning of the magazine, where articles are small

Microsoft Readies WinXP's First Service Pack

Good news for third-party developers, bad news for freeloaders


Add or Remove Programs
A program configuration specifies default programs for certain activities, such as Web browsing or sending e-mail, and which programs are shown on the Start menu, desktop, and other locations.
Change or Remove Programs
Add New Programs
Add/Remove Windows Components
Set Program Access and Defaults
Choose a configuration:
Microsoft Windows
Non-Microsoft
Custom
Choose a default web browser:
Use my current web browser
Internet Explorer
Show this program
Choose a default e-mail program:
Use my current e-mail program
Outlook Express
Show this program
Choose a default media player:
Use my current media player
Windows Media Player
Show this program
Choose a default instant messaging program:
OK
Cancel

This program—nestled in the updated Add/Remove Programs control panel—lets you modify Microsoft apps.

In the eight months since the release of Windows XP Home and Professional, the code jockeys in Redmond have been hard at work adding features to their flagship OS. That's right, folks, WinXP is being primed to receive its first full-fledged Service Pack. It's sort of like Microsoft's version of an operating system bar mitzvah ("Our little OS is becoming a man!"), minus the cheesy band and party food.

The final code for WinXP SP1 won't be released until later this year, but we can still give you a sneak peak at the treats—and tricks—that are being readied for the Windows nation:

- Every WinXP security fix available at the time of SP1's release will be included as a native part of the code.
- USB 2.0 will be supported on the OS level. No extra OS drivers or patches will ever be required again.
- You'll get support for the .NET Framework, which will enable the seamless connection of newfangled devices like the Tablet PC, Mira, and Freestyle (see "Microsoft Bids to Reshape the PC," June 2002).
- The service pack facilitates the removal of previously "unremovable" components, such as *Windows Messenger*, *Internet Explorer*, *Windows Media Player*, and *Outlook Express*. Believe it or not, WinXP will be the first Microsoft OS since Win95 that will allow you to run an official, unhacked version of Windows sans *Internet Explorer*. Furthermore, system vendors will be able to configure which browser, mail client, and Java virtual machine ships with their PCs, and they won't be limited to the Henry Ford–esque choice of, "You can run any software you want—just as long as it's Microsoft."
- And, finally, the rub: SP1 also includes provisions to bite people who are using pirated Product Keys. If you're walking on the wild side, you won't be able to install SP1, and you'll be cut off from further updates via the Windows Update site (**www.windowsupdate.com**). But, hey, you shouldn't be stealing from the man, anyhow.

The Last CD Burner You'll Ever Buy?

Yamaha says its new optical drive is the end-all, be-all

We've grown used to tiny, incremental increases in CD burning technology—a few seconds shaved off burning times here, a neat-o feature added there. But Yamaha is about to shake up the industry with a monster of an optical drive that pushes CD burning far beyond anything we've seen before.

Although it's really not the most impressive aspect of Yamaha's CRW-F1 drive, the feature most people will be yammering about is Disc T@2 (that would be spelled "disc tattoo" in a world devoid of annoying product names).

Look at the back of any disc that's been burned to partial capacity, and you'll notice that the burned portion of the CD (which begins in the center of the disc and extends outward) is noticeably lighter in color than the unburned portion. By increasing the positioning accuracy and intensity control of the laser that burns your discs, the CRW-F1 is able to etch text and images in the unused portion of the CD.

Let's say you burn 200MB to a CD. On the unused portion of the disc, the laser can then burn whatever designs you want in the leftover space, which in this case would extend about three-quarters of an inch from the outer edge. Burn in your name, track titles, or even a pattern from one of those wild, circular ancient Mexican calendars.

But the CRW-F1 isn't just about disc tagging. For the first time in a CD burner rated above 16x, the 48x CRW-F1 is able to burn at full constant angular velocity (CAV). This means that the disc rotates at a constant speed while the laser sweeps from the inner ring to the outer ring. As the rings of the CD grow larger, data rates increase. Also, the laser doesn't have to pause in between speed "zones," a process that slows down burning times and creates minute gaps in the data stream (drives that do this are called Partial CAV, or Zone-CAV, implementations).

Yamaha says that the CRW-F1 can burn a full 80-minute CD in 2:43 minutes. And CD-RW burning—hang on—takes a mammoth leap to 24x.

Because CD burners are unlikely to get much faster than this (save for a few seconds here, and a neat-o feature there), Yamaha is positioning the CRW-F1 as the last CD burner you'll need before everyone begins to gravitate toward DVD burners. Is that so? We'll let you know in the next couple of months when final production units arrive.

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Videocards to Learn New Languages

Will your GPU be talking Cg?

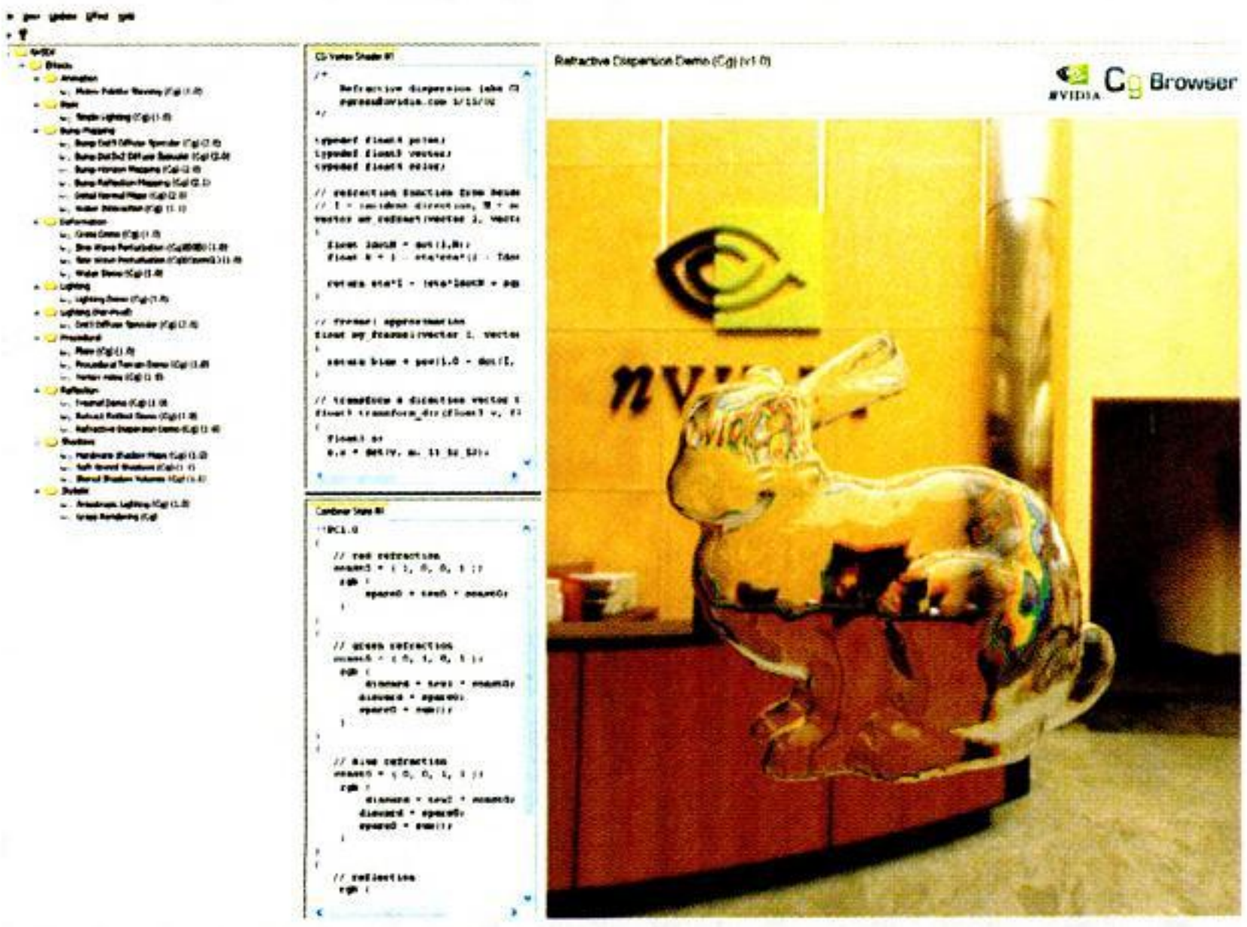
Writing programs that enable all the fancy shaders on your GeForce4 and Radeon 8500 is no simple task. In fact, it's a real drag. That's one of the reasons that we haven't been inundated with games that use DirectX 8 programmable shaders. nVidia and 3Dlabs want to rectify this problem with the introduction of two high-level programming languages that should make writing shader programs easier.

Currently, 3D shader programs are written in assembly language—essentially the native tongue of a 3D chip. Assembly language is considerably more complex and difficult to master than a higher-level language, such as C. To makes things worse, ATI and nVidia's GPUs each speak different dialects of assembly language, so game developers have to write two shader programs for every effect they want to enable.

nVidia's new language, dubbed Cg ("C for graphics," or so we're told), aims to fix this by introducing a high-level language, similar to C, that will allow game developers to write one code snippet that will run on all programmable shader cards. Of course, Cg isn't the only game in town. 3Dlabs is also pushing a high-level shader language as a part of the OpenGL 2 spec.

The secret to both companies' technology is in the compilers. If they have their way, all of the 3D vendors will write compilers that convert the easy to write high-level language—either Cg or OpenGL 2—to the more difficult assembler code. This fixes two problems for game developers. First, they can use a more friendly C-like programming language to write their shader effects, and secondly, they will only have to write the shader programs once in the high-level language, then let the compiler worry about making them work on the different hardware platforms.

Naturally, this sets the foundation for another rip-roaring standards war. The question is, Which high-level language will developers adopt? nVidia's is a part of DirectX 9, 3Dlabs's is a part of OpenGL 2.0. Check the 3Dlabs feature on page 44 for its side of the story, and stay tuned to future issues of *Maximum PC* for more on the developing situation.



The Cg effects browser lets developers see simple sample code and the effects they can create. It also displays the complex assembler code that would be required to create the same effects.

GAME THEORY BY THOMAS L. McDONALD

T.V. Takes All the Fun out of Games

Gamers, who clearly don't spend enough time soaking up low-level radiation from their TVs and monitors, now have another reason to avoid human contact and fresh air. Comcast has launched G4, a "24-hour" TV network devoted to games. Its eyeball-peeling content features a grating combination of witless hosts and warmed-over game footage. G4 seems to have about five hours of original programming per week repeating in an endless loop, interrupted only by infomercials. One show is nothing more than a solid half-hour of watching games being played, without commentary. Cuba is busy taping much of this for use in torture sessions.

There are a number of different shows with meaningless one-word titles like *Blister*, *Filter*, and *Pulse*, but it all blurs together into a nonstop mush of mediocre game commentary. The shows that stand out, such as *Portal*, do so because of their unspeakable awfulness. A massively multiplayer gaming show, *Portal* looks like a B-minus project from a junior-high TV production class. The premise mixes childish host segments with "reports" from characters "inside" online RPGs. This amounts to dodgy capture footage and pathologically unfunny voice-overs along the lines of, "Well, I'm here in Kunark, and boy do those trolls look scary!"

Nothing, however, quite compares with *Arena*, a competitive multiplayer gaming show. One host is a fat guy with a high, squeaking voice that falls somewhere between Don Adams on helium and a castrati. The other host is Wesley Crusher. That's right! Wil Wheaton! The single most hated character in the history of the *Star Trek* franchise! The Enterprise's own Jar-Jar Binks is now a color commentator for a computer gaming show, a gig that is the last stop before Crack Whore on the downward career spiral. Their banter is an excruciating mix of the imbecilic and the inane.

Wesley Crusher: "I had trouble not blowing myself up the first time I played *Counter-Strike*!"

Castrati: "That's because you're a loser."

Both: "Ha ha, ho ho, hee hee."

This kind of sly wit is dragged out for 30 unrelenting minutes over footage of some remarkably lame gamers playing moldy oldies like *Counter-Strike*. Most of these guys couldn't frag their own asses with a sackful of grenades. Sucking at *Counter-Strike* in the privacy of your own house is one thing. Sucking at it in several million homes during prime time is another thing entirely.

G4 seems to have missed a crucial point about gaming: its interactivity. Anyone who has watched someone else play a game for more than a minute knows that the pressure to rip the controller out of his hands and play it yourself is almost unbearable. Offering 24-ish hours of this (with no controller!) is merely sadism packaged as entertainment.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

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OS THERAPY

Windows Tips Because I Love You

Let's give Windows Messenger a permanent time out!

Sometimes you need to sleep your troubles away. I find that a midafternoon nap does the best job, especially if I light my favorite peppermint incense and close my lace curtains before I start. Why would anyone as well-adjusted as I require slumber therapy, you ask? It's that sassy *Windows Messenger*—it keeps popping up on its own volition, violating my personal space, and diminishing my inner Peter.

But, luckily, there's a fix. I explained my problem to Gordon Ung, and he showed me how to completely uninstall *Windows Messenger* from my WinXP system! Here's the procedure:

First, go to the Start Menu and click the Run button. Then type `cmd` and press OK. Now make sure you're the only person logged into the computer and that all *Internet Explorer*, *Outlook Express*, *Windows Messenger*, and *MSN Messenger* windows are closed. (To be safe, you might as well close all your apps). Finally, type this into the command line window you opened: `RunDll32 advpack.dll,LaunchINFSection %windir%\INF\msmsgs.inf,BLC.Remove`

Make sure there are spaces after RunDll32 and LaunchINFSection, and press Enter. This should banish

Peter Matthews, Mr. Nice Guy

Messenger, but if you still get a prompt after you enter this command, just read the instructions that come up and press Enter.

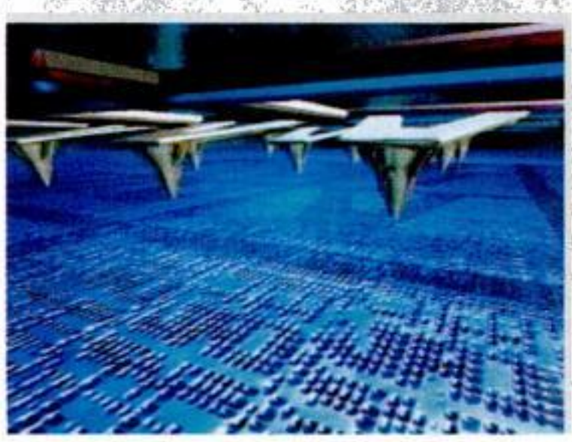
To keep *Windows Messenger* gone for good, you need to maintain vigilance. Every time you visit Windows Update and a new "update" for *Messenger* is available, make sure not to select the option to update it, or you'll reinstall the naughty app! Luckily, my little brother Dickie says that the first service pack for XP will include a setting to let you remove *Messenger* without going through this hassle.

Isn't Microsoft thoughtful?!

IBM's Millipede Writes with Itty-Bitty Feet

Punch cards, first used more than 110 years ago to automatically tally the results of the American Census, are making something of a comeback in IBM's research project code-named Millipede. The new storage technology packs a trillion bits of data per square inch by punching tiny holes in a polymer substrate.

This rewritable technology uses an array of tiny V-shaped cantilevers with sharp tips at the end to punch indentations into a thin film. Remember those toy "drinking birds" that keep bobbing into a glass of water once you gave them a push? Yeah, it works like that.



The first Millipede prototype used 1,024 sharp tips to achieve an areal density of 200Gb per square inch. Compare that with today's IBM 60GXP hard drive, which has an areal density of 15.3Gb per square inch! The next prototype will quadruple the number of tips, and is expected to be able to write half a gigabyte in an area 3mm square.

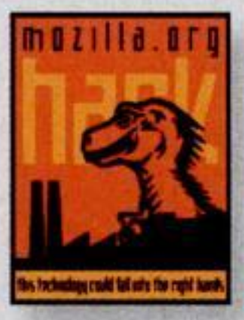
IBM sees the technology as a high-capacity, low-power alternative to contemporary flash memory, but it may be some time before the Millipede is set free.

FUN-SIZE NEWS

Picture This Virus

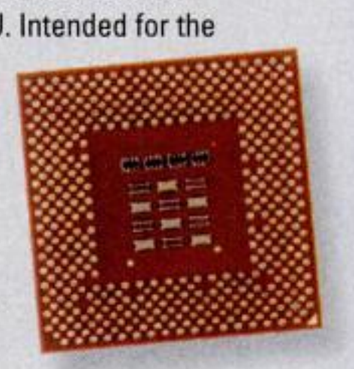
The alarm has been sounded on a new type of virus that can propagate through the JPEG format. Although it is the first known virus that can be spread through JPEG files, Network Associates has classified the W32/Perrun virus as a limited threat. The virus is actually a proof-of-concept, and not anything that can cause harm in its current iteration. According to news reports, it was sent to Network Associates to alert the company of potentially devastating things to come. The virus hasn't been publicly disseminated, and it cannot spread without a user's machine first being infected by a small executable.

Mozilla Rises Again



Mozilla, an open-source web browser project started by Netscape, has finally come to fruition after nearly four years of beta coding. *Mozilla* suffered a humiliating debut when its core technology was used in *Netscape 6.0*, a bug-laden browser that was quickly put out of its misery by the *Internet Explorer* juggernaut. The *Mozilla* browser is hoping to win the hearts of open-source enthusiasts and web surfers by including an automatic pop-up add killer, chat software, and a full e-mail client. Download *Mozilla 1.0* at **www.mozilla.org**.

The Last Palomino



AMD's Palomino is getting a final trot in the form of the 1.73GHz Athlon 2100+ CPU. Intended for the workstation server market, the latest Athlon MP will be the final Palomino using the Athlon name. AMD is scheduled to move its MP line to a new 0.13-micron process later this year before introducing the "Barton" version of the chip, which will include more L2 cache. In June, AMD made the crossover to a 0.13-micron process for its Athlon XP desktop CPU. The Athlon MP has traditionally lagged behind the desktop ponies by a few months. Intel, meanwhile, has its Xeon CPUs ticking at 2.4GHz.

Wal-Mart and Lindows Team Up

After surprising the hell out of everyone by shipping bargain PCs without *any* OS early this year, Wal-Mart is poised to deliver another blow to the Microsoft hegemony. Walmart.com is now selling Microtel PCs preconfigured with the Linux-based Lindows OS. For $300, you can buy a system that includes AMD's Duron 850MHz CPU, 128MB of SDRAM, onboard Trident Blade graphics, a 10GB hard drive, a CD-ROM drive, Ethernet support, a handful of productivity apps (including viewers for Microsoft Office documents), and a game called *Potato Guy*. Floppy drive and monitor are not included. Big spenders can dole out an extra $300 for a 1.8GHz P4, 256MB of DDR memory, and 40GB hard drive.

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A New Dimension for 3D Graphics

New 3D graphics chips are gaining another dimension: programmability. The P10 VPU (visual processing unit) from 3Dlabs brings a higher level of programming flexibility to the pixel-processing stage of the graphics pipeline. This will allow programmers to create dynamite visual effects.

The P10 appeared in June on graphics cards for computer-aided design (CAD) workstations. Lower-priced cards for consumers are coming this fall. All P10 chips have the same basic core, although there are some differences, such as the amount of on-chip memory and the number of processing pipelines.

What sets the P10 apart from other graphics chips is the unprecedented level of programmability. Until now, graphics chips have differed from regular microprocessors in an important way: Their pixel-processing pipelines couldn't execute some basic programming structures, such as conditional branches and loops.

A conditional branch is like a fork in the road—a program can choose from multiple paths of execution in response to user input and other events. Loops allow a program to execute a series of instructions endlessly until a predefined condition is met. (The exit from a loop is a branch.) With those features, the P10 has a greater ability to change the appearance of an object in response to a game player's actions or other elements in a game. For example, a breeze could ruffle an animal's fur if your character opens a window. Programmability gives developers much more freedom to differentiate.

Branching and looping are such fundamental building blocks that anyone who is familiar with programming might wonder why 3D graphics chips haven't offered such features before. The answer is that graphics chips began as simple fixed-function devices that were "hard-wired"—nonprogrammable. A program running on the computer's CPU simply called those functions as needed, as you do when performing arithmetic on a calculator. The P10 is like a programmable calculator with customizable functions.

Gamers aren't the only winners. The P10's internal multithreading and parallelism also accelerate wavelet compression (for digital imaging), MPEG motion estimation (for video processing), anti-aliasing (for smoother graphics), and other graphics tasks.

A few existing chips, such as nVidia's GeForce3 and GeForce4 and the ATI Radeon 8500, already have some programmable geometry and texture processing. But the P10 is the first with fully programmable pixel processing. Next-gen chips from other companies will almost certainly follow the P10's lead.

Theoretically, there's a downside to greater programmability. Fixed-function processors often achieve higher performance than equivalent programmable processors. But graphics performance is reaching such heights that this probably isn't a factor. The greater flexibility to tweak their 3D graphics is a trade-off that game developers will welcome.

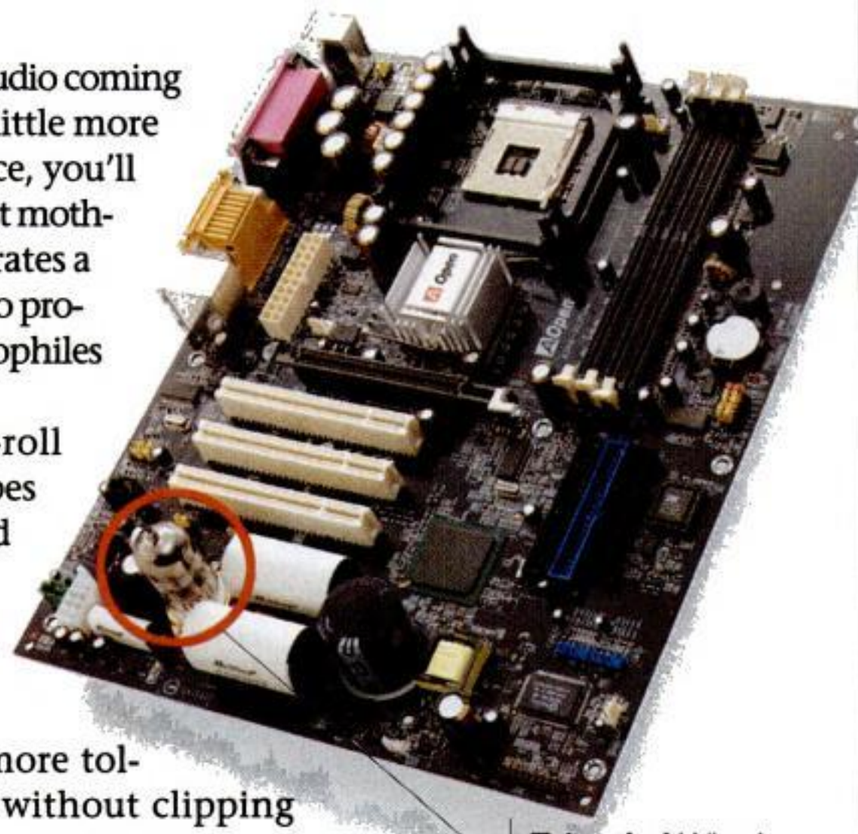
See Maximum PC's interview with Neil Trevett on page 44 for more details.

Tom Halfhill was formerly a senior editor for Byte *magazine and an analyst for* Microprocessor Report. *He is now a technical writer/analyst in Silicon Valley.*

Totally Tubular

Say hello to the world's first tube-based motherboard—and, no, it's not a joke

If you've always felt that the audio coming out of your PC could use a little more warmth, a bit more presence, you'll want to check out AOpen's latest motherboard. The AX4B-533 integrates a classic vacuum tube amplifier to provide the rich tonality that audiophiles have sworn by for years.



Tube-tied: What's next, an integrated wah-wah pedal?

Conventional rock-and-roll wisdom says that vacuum tubes produce a much richer sound than that achieved by solid-state transistors. Vacuum tubes are also said to have a particularly unique audio signature, and are also far more tolerant of wild signal swings without clipping and distortion.

Al Peng, a product manager at AOpen, thought his motherboards could benefit from tube-based audio, and thus the AX4B-533 was born. Based on what AOpen learned from studying classic, tube-based pre-amps, the oldfangled mobo uses a single dual-triode (one tube with two stereo channels) to pump its rich melodies. If you like, you can also install your own soundcard in the mobo, then channel its output through the tube. This ensures that you'll be able to play all your DirectSound3D games in a rich mellow that would make Hendrix proud.

The board is based on Intel's 845E chipset and offers support for DDR266 as well as six USB 2.0 ports. The AX4B-533 is expected to be on sale this summer and will have a list price of $215.

SiS Quietly Enters the 3D Fray

Pretty on paper, but where's the horsepower?

If the 3D accelerator market was a car race, you'd find nVidia and ATI at the front of the grid, and Matrox and 3Dlabs/Creative Labs in the third and fourth slots. But that doesn't mean the race is limited to just four competitors. That's right, in addition to a weak 3D entrant from VIA, the grid now includes a low-horsepower chip from Silicon Integrated Systems—the Xabre 400.

On the surface, the Xabre 400 is an impressive package, boasting pixel shaders as well as support for 8x AGP, anti-aliasing up to 4x, and DDR SDRAM in different configurations up to 128MB. But while the Xabre does include DirectX 8 pixel shaders, it doesn't include any vertex shaders. This means that while it will support bump-mapping, you won't get any nifty volumetric grass or morphed models.

We're duly impressed with SiS's prowess in naming its features. With names like the Pixelize Engine (pixel shader), Frictionless Memory Control (memory controller), and Xminator XP (unified driver), we almost thought that someone from the nVidia PR department had defected to SiS.

We haven't yet received a final card, but we'll let you know what we think when the Xabre 400 is ready for a test drive.

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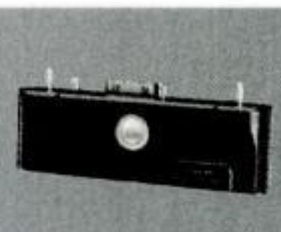

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Head2Head

A showdown among natural PC competitors

THIS MONTH: Sound Forge 6.0 vs. WaveLab 4.0

Serious people need serious tools—and we've got new versions of two ultra-serious sound-editing apps right here. Either one of these packages could be called the *Photoshop* of sound. They let you analyze waveforms and pick out audio glitches like virtual nits. They let you crossfade all your favorite songs and send the results directly to CD. They let you piece together random audio loops to create your own techno mix. And they even let you drown unprofessional recordings in professional effects to completely reinvent any piece of music you can load into your PC.

In short, both *Sound Forge 6* and *WaveLab 4* give you an audio canvas upon which you have virtually unlimited freedom to shape, tweak, and enhance your audio files. Although both applications provide plenty of options for the professional sound designer, for this slugout we decided to focus on the specific common tasks that make audio editors so handy.

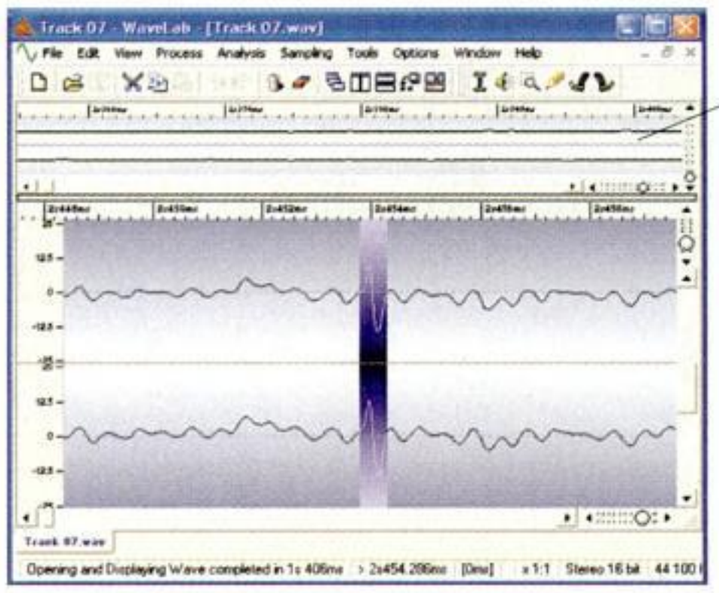
—LOGAN DECKER

STEINBERG WAVELAB 4.0

MP3 encoding: Both apps support CDB MP3 encoding up to 320kbps, VBR encoding with adjustable quality settings, and WMA encoding up to 160kbps. *WaveLab* can also embed MP3 tags and write checksums (so that other applications can check the integrity of the file). Best of all, just dump a bunch of files into the batch-processing dialog, and *WaveLab* will perform any number of processes to all the files (such as normalizing the volume of each track and compressing all of them to MP3). **Winner: WaveLab—by a hair**

MAXIMUM PC KICK ASS PRODUCT

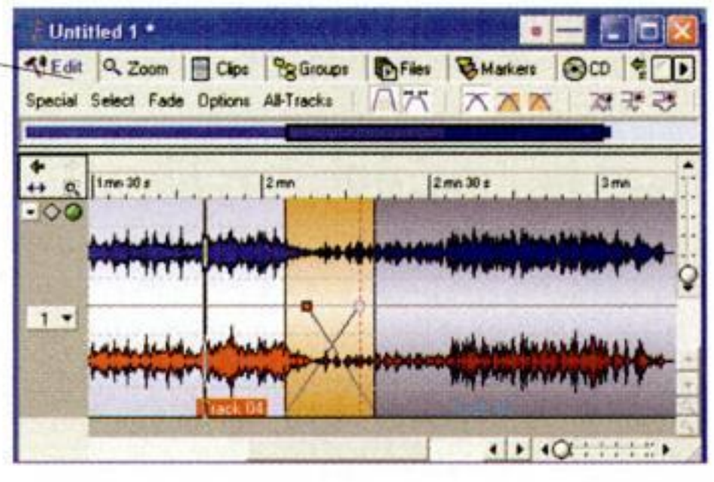
Digital audio extraction: *WaveLab* offers an astounding number of extraction options, including a "safe mode" extraction that re-reads individual sectors until identical results are received. *WaveLab* will automatically create peak level files, grab track names from the CDDB database, and rip directly to MP3 or WMA format. **Winner: WaveLab**


Track 07 - WaveLab - [Track 07.wav]
File Edit View Process Analysis Sampling Tools Options Window Help
Track 07.wav
Opening and Displaying Wave completed in 1s 406ms

Click and pop removal: *WaveLab's* unique vertical zoom—which exaggerates the peaks and valleys of waveforms for easier editing—made it easier to find some types of audio glitches, which could then be squelched with the Waveform Restorer. Still, *Sound Forge's* glitch detection helped us zoom in much faster, and gave us more freedom in correcting the errors. **Winner: Sound Forge**

Interface: Many of the icons are miniature versions of the actual windows they represent—far better than most of *Sound Forge's* mysterious glyphs. Control panels are accessible via the menus or dockable windows. There are separate, collapsible windows for master mixer controls, and each separate file you're working on gets a small tab at the bottom (just like multiple spreadsheets with *Excel*). **Winner: WaveLab**

Audio file mixing: *WaveLab's* "Audio Montage" is a convenient workspace accessible from the File menu that allows you to combine, edit, and otherwise manipulate multiple tracks within a single (and savable) window. Pasting an audio clip over another clip places a visual crossfade editor where the two clips overlap. The handles of the "X" allow you to adjust the fade-in and fade-out position, and the volume levels of each. **Winner: WaveLab**



Gee-whiz effects: Although *WaveLab* offers just about all the tools you'll need for loop creation and standard mastering tasks (normalization, dynamics, gain control, and pitch correction), it still can't compete with *Sound Forge's* virtual grain silo of highly configurable effects. **Winner: Sound Forge**

MAXIMUM PC VERDICT

WaveLab 4.0
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9

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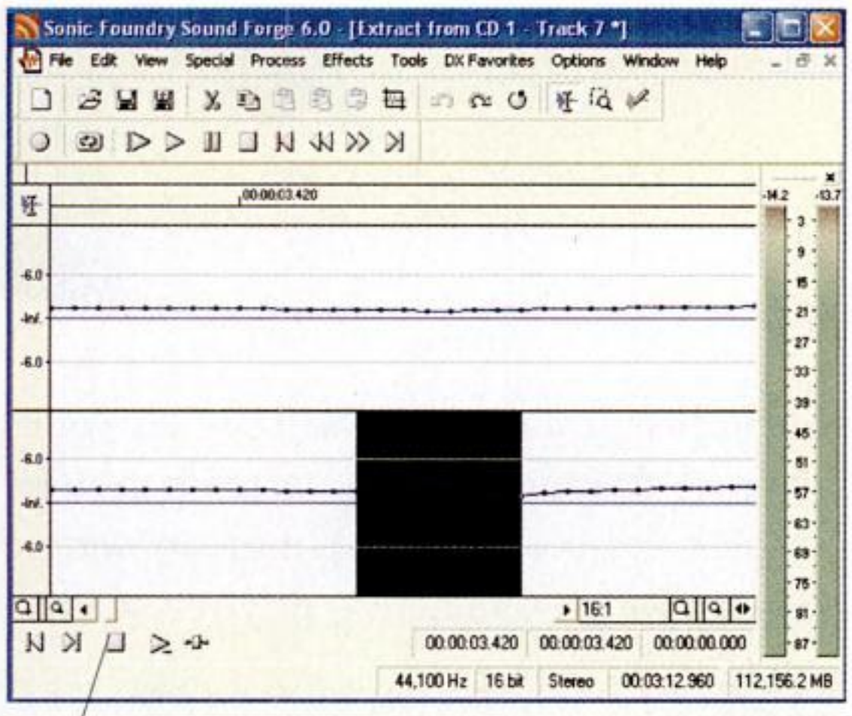
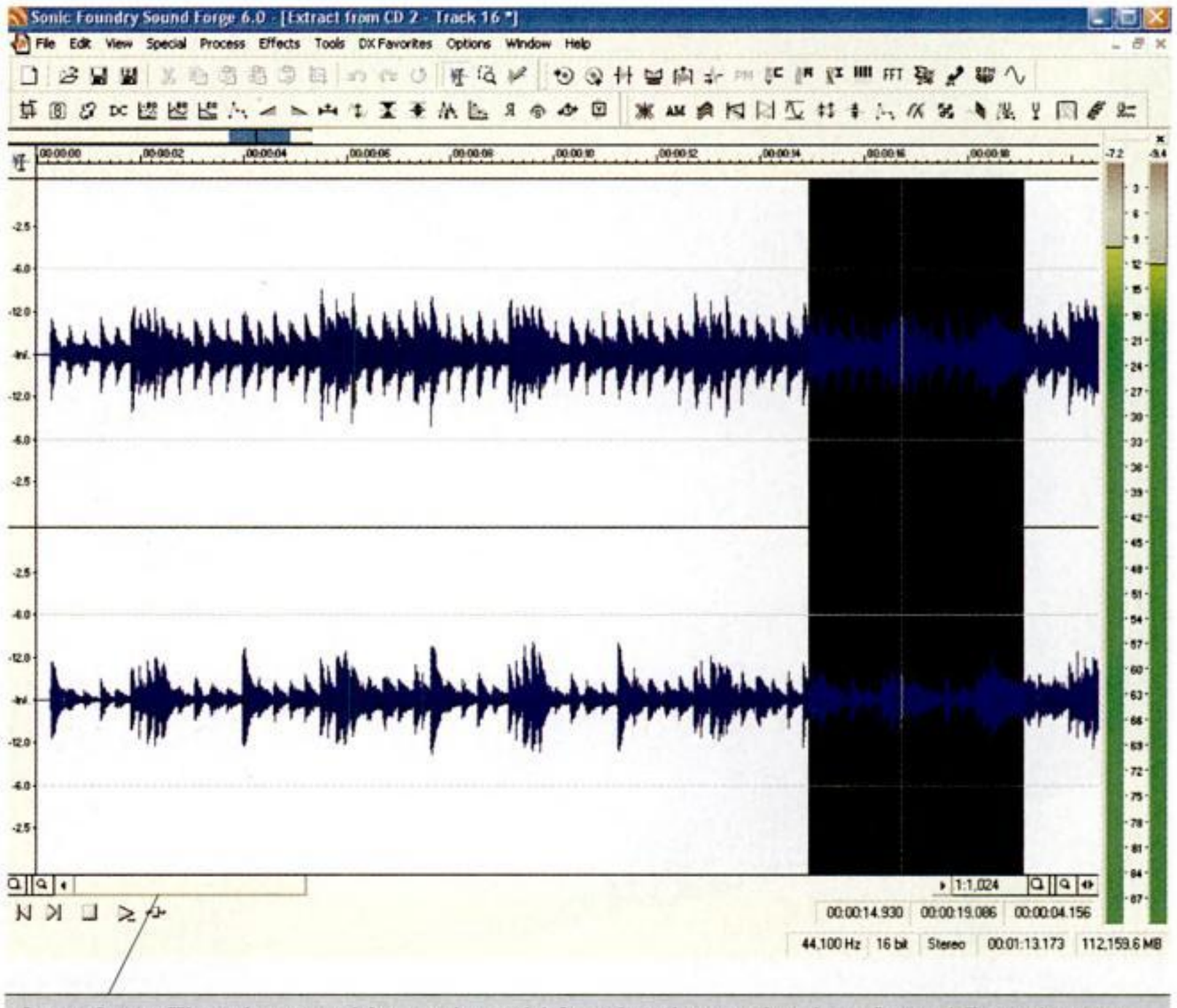
SOUND FORGE

MP3 encoding: *Sound Forge* offers the same maximum bitrates for encoding to MP3 and WMA, but also allows you to encode to OGG, RM, and MOV format if you're so inclined. Although *Sound Forge's* VBR encoding options are slightly more tweakable than *WaveLab's*, the "quality" sliders aren't explained in the documentation. This, combined with the fact that you need to register in order to get unlimited MP3 encoding and batch processing, pissed us off just enough to snatch the award from *Sound Forge* and give it to you know who. **Winner: WaveLab**

Digital audio extraction: Like *WaveLab*, *Sound Forge* allows you to preview tracks directly from the extraction screen and will permit extraction of specific tracks or ranges (this is useful for ripping portions of long tracks). Unlike *WaveLab*, however, *Sound Forge* does not support track name importation from CDDB or FreeDB, and that sucks. **Winner: WaveLab**

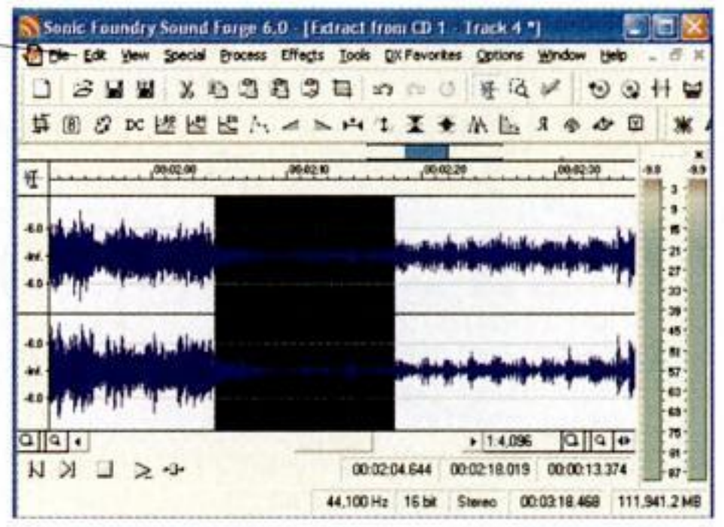


Click and pop removal: *Sound Forge* has a helpful glitch search feature that can automatically zoom you in very close to offending passages with little aggravation. If the three repair options (Interpolation, Replace, and Copy Other Channel) don't fix things, you can even draw in your own correction with the pencil tool! **Winner: Sound Forge**



Interface: There's something to be said for visual restraint, but *Sound Forge's* gray, flat workspace and many inscrutable icons literally pale in comparison to *WaveLab's* colorful interface and familiar mixer-like panels. The toolbars are dockable, but are generally little more than a series of icons or characters. The useful "Views" toolbar, however, remembers cursor positions and settings within files. **Winner: WaveLab**

Audio file mixing: Instead of *WaveLab's* visual displays, such as the crossfade example, *Sound Forge* gives you opaque dialog boxes that ask you to specify numerical values with a slider. Unless you think in decibels, this is an unsatisfying and unintuitive process. **Winner: WaveLab**



Gee-whiz effects: *Sound Forge* lays it on thick with a *Photoshop*-like menu of effects. These range from the quotidian (chorus, noise gate, reverb) to the positively orbital (a gapper that interpolates tiny gaps at intervals throughout your sample). The Acoustic Mirror allows you to simulate the sonic properties of any physical space—like for example, the Vatican. Your processed sound would consequently sound as though it were played right there in front of the Pope himself. **Winner: Sound Forge**

MAXIMUMPC VERDICT

Sound Forge 6.0
SONIC FOUNDRY

www.sonicfoundry.com
$450 boxed, $400 download

9

WINNER: WAVELAB 4.0!

Download the datasheets for these programs if you're interested in sound editing for specialized purposes. For example, *Sound Forge* allows the importation of MOV, WMV, and MPEG-1 & 2 files with video previews, which is a crucial feature for DV editors that *WaveLab* lacks. *WaveLab*, on the other hand, offers a go-ahead-and-dive-in interface, and also sports the most generous license we've ever seen in a professional product, permitting installation on any number of PCs that you own. Now that sounds good to us. ■

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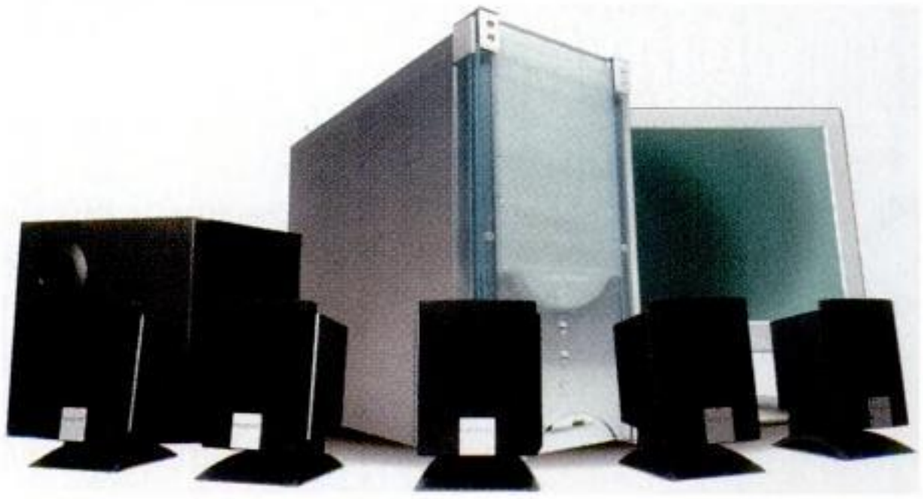

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WatchDog

Say hello to Megan, WatchDog of the Month.

Maximum PC takes a bite out of bad gear

THIS MONTH: The WatchDog goes after...

> UMAX > Counterfeiters > Razer

IBM Update

A class-action suit against IBM over its allegedly defective 75GXP hard drives was struck a blow when a judge ruled that the case cannot be granted status as a nationwide class-action. Alameda County Superior Court Judge Ronald Sabraw ruled that the lawsuit cannot proceed as a nationwide class-action suit because California is under no obligation to resolve the claims of consumers in other states. Judge Sabraw, however, did not throw out several key claims of the original lawsuit, which will continue as a class-action suit in California. (More information on the suit is available at www.sheller.com/ibmclassaction.htm.)

In other news, IBM officials told The Dog that despite the sale of its hard drive division to Hitachi, consumers should not be afraid to buy its products. "All specific commitments to deliver products will be met and all warranties will be honored," said a company spokeswoman.

Finally, for those who remember the stir over whether IBM's new 120GXP could run 24/7 without coughing up a fur ball, *Maximum PC*'s test unit has been running continuously in a machine for three months without a problem.

Counterfeit Holograms

Counterfeiters are hard at work making you think you're paying for an authentic piece of software when all you're really getting is a pirated disc. Among the most aggressive companies to prevent counterfeiting, Microsoft introduced an edge-to-edge hologram with Windows 2000 and Office 2000 that made them near-impossible to counterfeit. That is, until recently. The Dog examined three counterfeit copies of Microsoft Windows Millennium that were seized by Microsoft in raids, and found the quality to be amazing. Move the CD from side to side and you'll see the telltale word "Genuine" interspersed with "Microsoft" on the CD's surface, as well as a holographic image of the Windows logo. Of course, the fakes look good only when compared with other fakes. Hold one up against an authentic Microsoft Windows ME disc with the edge-to-edge hologram, and you'll instantly see the difference in color depth. The fakes look nearly monochromatic in color and reflectivity. If you look at the fake disc under a loupe, you'll notice the absence of a few other features, such as the microscopic writing that encircles the "Microsoft/Genuine" label on the authentic disc. Another easy way to determine whether you've got a fake is to touch the surface of the disc. On a genuine hologram disc, the hologram will be embedded in the disc and under the hard plastic coating. On the fakes, the hologram is nothing more than a sticker. Scratch at it hard and you'll nick the hologram or be able to peel it away. In the counterfeits that The Dog viewed, a plastic coating over the hologram ripped off easily to reveal the true, duplicitous nature of the disc. More information on how to detect a fake can be found on Microsoft's web site at: www.microsoft.com/piracy/htt/.

Can you tell the difference? The real Microsoft disc is on the left and shows more color depth and contrast, and has a hologram that cannot be scratched off. The fakey has a plastic sticker which easily peels off to reveal its false pedigree.

Counterfeiters aren't just hitting Windows ME and Office, but likely Windows XP and Office XP. Watch this space for more information on other counterfeit activities including CPUs, mice, and motherboards.

No Free Drivers For You!

DEAR DOG: I have a huge gripe against UMAX Technologies, Inc. The company no longer offers free driver downloads for its scanners. I recently upgraded my system to Windows XP and had no problems getting drivers for the hardware until I needed one for my UMAX Astra 2200 scanner. UMAX is charging big bucks for any updated drivers that you would need for Windows 98 through Windows XP. Not only that, but if you use two different platforms, such as a Mac and PC (which I do), you have to buy a driver for each system.

Reluctantly, I bit my tongue and ordered the driver for a fee of $28. The disc I received three weeks later was just CD-R, and it was damaged!

Needless to say, I am totally disgusted and will not be using this scanner, nor will I ever buy another UMAX product. I think you should expose this company for its greed. The scarier issue is whether many other manufacturers will follow suit.

"UMAX is charging big bucks for any updated drivers that you would need for Windows 98 through Windows XP."

— PAMELA ROBERTS

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.

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THE DOG RESPONDS: As many people are discovering when they transition to Windows XP, the drivers for older products are always the last thing to be updated. The UMAX situation, however, is especially odorous. The Dog never had much success contacting company officials when UMAX was located in Fremont, Calif., and has had even less luck reaching officials at its new Dallas, Texas headquarters. However, the news web site TheRegister.co.uk did manage to track down Wenn Lin, the company's general manager. In an interview with The Register, Lin reportedly said that UMAX no longer offers the drivers online because they're too big.

"This is not a driver, this is a program," Lin told Register reporter Andrew Orlowski. "As a program it's 30MB; it's quite big—if we put it on an FTP site it would take too long to download. That's why we decided to change it. Our driver is part of our entire program, so we don't distinguish between driver and program."

For consumers in the United States, Canada, and South America, the only way to obtain drivers from the U.S. arm of UMAX is by paying for a CD-R. Craftier consumers will simply ignore UMAX's questionable policy and download the drivers from other UMAX entities, where free drivers are still available. If you own a UMAX scanner, point your browser to umax-europe.com, www.umax.co.uk, or even www.umax.de for the downloads. The Dog found drivers for most of UMAX's scanners, including its parallel port scanners, which the company stopped supporting, claiming incompatibility with XP. A doggie bone goes to the Register for biting UMAX.

Of course, the question consumers now face is whether this is the kind of service to expect from a technology company. Bandwidth is certainly not free, but making drivers available for download for those 2:00 a.m. emergencies is a service that builds customer loyalty. Companies that refuse to make those files available probably don't deserve your support, and even more importantly, your money. Consider UMAX and its products in the Dog House until it mends its ways. Woof.

Good News, but The Dog Is Sure Someone Will Still Complain

DEAR DOG: I have a Kensington Expert Mouse Pro trackball. Within the first year, the horizontal tracking stopped working. After a 20-minute hold time and three-minute conversation, Kensington shipped me a brand-new device, not refurbished, and asked me to please send back the old one to find out why it failed. I will send back the device because Kensington makes a good product and obviously cares, which is rare these days.

Hats off to Kensington, it now has a brand-loyal customer. Was that so hard?

— JAY RAMBIN

Razer Razed Again?

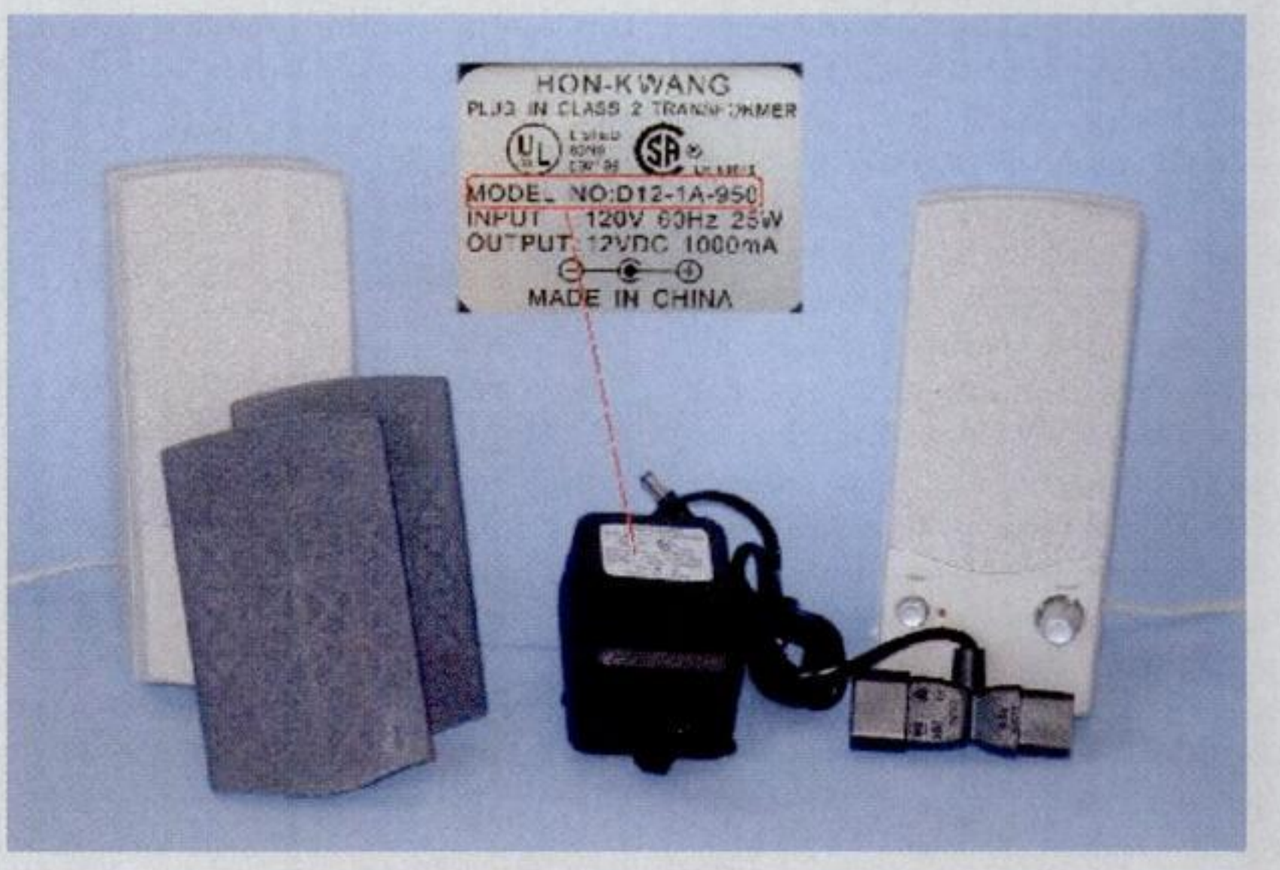
DEAR DOG: After reading in your column that Razer Boomslang Mice were once again available for sale, I purchased one. At the time, the company's online store was not working and all sales were being conducted through eBay. I purchased a Boomslang 2000dpi on January 26th 2002. I received it defective and asked for an exchange unit. One month after my original purchase, I received my second mouse, which was also defective. I sent both back asking for a refund, and I was told that would not be problem. It is now more than two months later, and no one is responding to my e-mails. I tried to leave negative feedback on eBay, but Razer is no longer a registered member. I'd like to warn other consumers to stay away from this company.

— FRANCIS BISHOP

THE DOG RESPONDS: Bishop isn't the only reader to bark about the situation at Razer. Other readers have noted that the company has promised XP drivers for months without delivering the goods. The Dog contacted Mike Luther of Leftbid.com, which had picked up distribution of the Boomslang mice for Razer. Luther apologized for the mix-up and said he would look into the refund. As for XP drivers, Luther told The Dog they were due "ASAP." After more than a month, however, no XP drivers have materialized, and Luther has stopped responding to inquiries about Razer's status. Although Razerzone.com has not sold the mice through its online store or eBay for some time, the company's lack of activity and its failure to respond to requests for more information put it back in the Dog House. Unless you're in love with the mouse's shape and precision, The Dog cannot recommend that you purchase any Razer equipment until the company's status is more clear. Woof. ■

RECALL ALERT
Phillips Speakers May Shock You

Philips is recalling some 93,000 power adapters for speakers that were sold with Hewlett-Packard business PCs. The adapters are not grounded, which poses a potential shock hazard. HP received just one complaint of the adapter not being grounded, and there have been no reported injuries. The power adapters were included with HP's P1534A External Amplified Speaker set. A label on the bottom of the speakers reads "P1534-60001," and the power adapter bears a white label reading "Model D12-1-A-950" and "Made in China." A majority of the speakers were sold with PCs that went to businesses, but some of the computers were then sold to employees for personal use. The adapters were sold between October 2000 and April 20002 for $34. The Consumer Product Safety Commission recommends that consumers with the adapters unplug the T-junction and stop using the speakers. For a free replacement contact Philips Electronics at 800.870.7193 between 8:00 a.m. and 5:00 p.m. central time, Monday through Friday. More information can be found at www .philips.com/us or at www.adapterrecall.com.



Philips speakers that sold with some HP PCs are being recalled.

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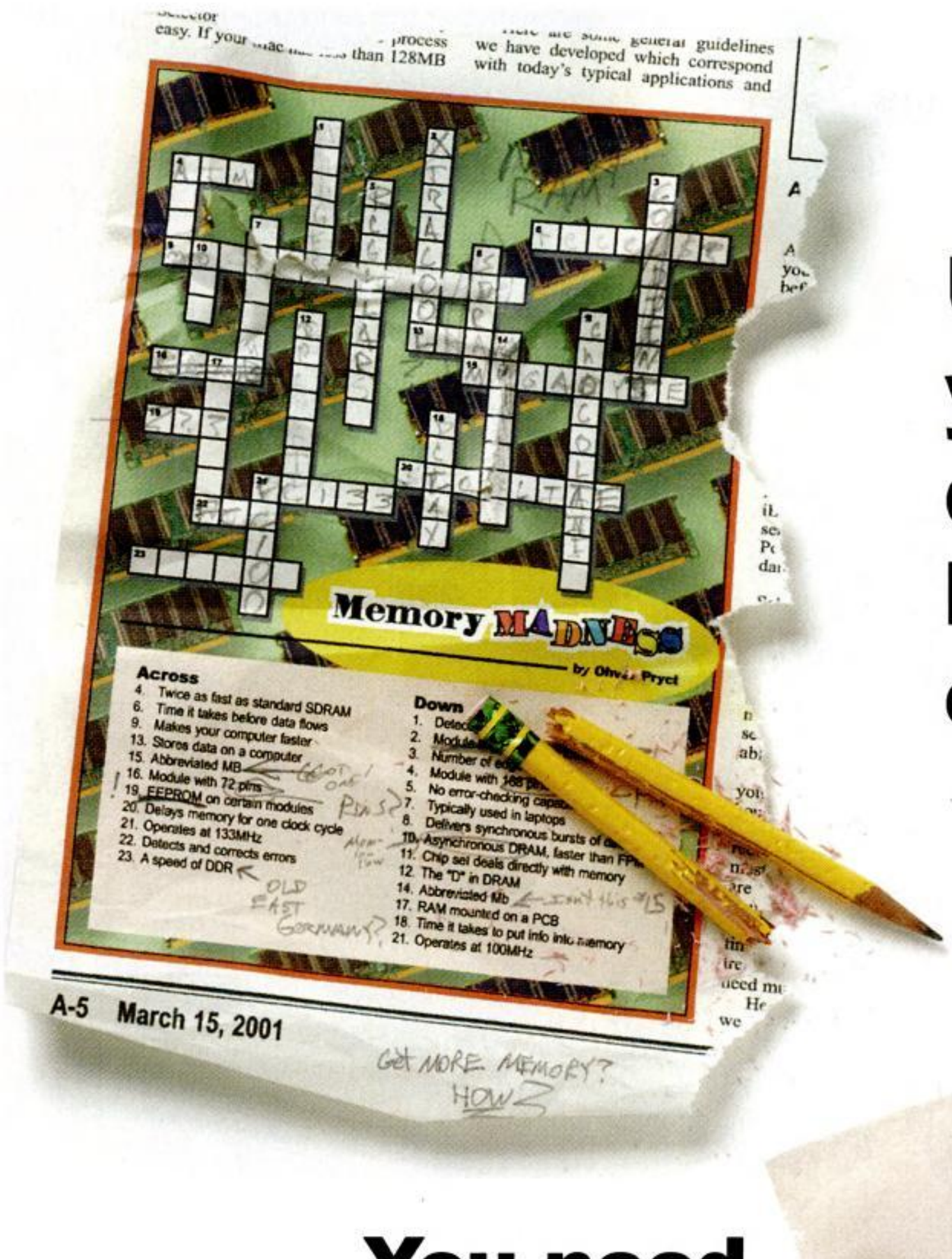
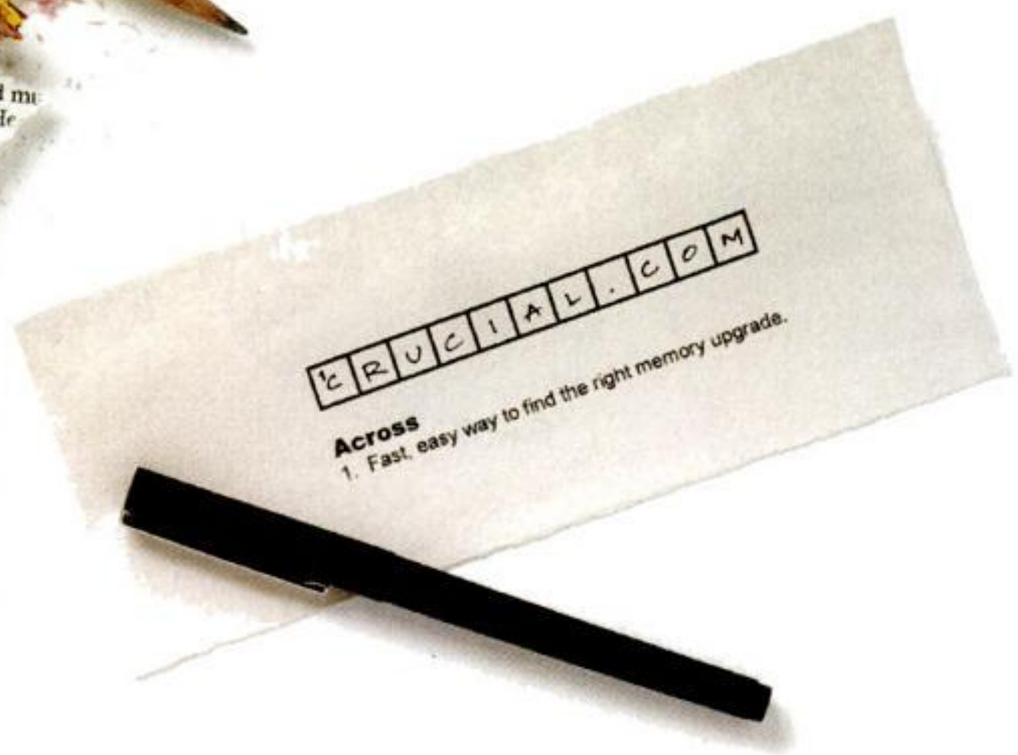

Memory MADNESS
Across
4. Twice as fast as standard SDRAM
6. Time it takes before data flows
9. Makes your computer faster
13. Stores data on a computer
15. Abbreviated MB
16. Module with 72 pins
19. EEPROM on certain modules
20. Delays memory for one clock cycle
21. Operates at 133MHz
22. Detects and corrects errors
23. A speed of DDR
Down
1. Detec
2. Module
3. Number of
4. Module with 168
5. No error-checking capa
7. Typically used in laptops
8. Delivers synchronous bursts of
10. Asynchronous DRAM, faster than FP
11. Chip set deals directly with memory
12. The "D" in DRAM
14. Abbreviated Mb
17. RAM mounted on a PCB
18. Time it takes to put info into memory
21. Operates at 100MHz
A-5 March 15, 2001
GET MORE MEMORY? HOW?



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Give Your PC a

Clean Start!

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Reinstall ➡ Preserve ➡

How to wipe away system build-up and create your own personalized recovery discs!

—BY JOHN TUMMINARO

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Here's a classic Windows-ism for you:

"Uninstall completed. Some elements could not be removed. Manually remove these items." Apparently the uninstall was *not* completed. WinXP may be the tidiest OS to ever come out of Redmond, but it's still plagued by the build-up of digital crud that results from sloppy housekeeping. Applications deleted long ago leave behind remnants. Spyware leaves smelly droppings throughout your system folders. File fragments, temp files, and obsolete driver packages clog the pipes. All this crap slows down performance, extends search times, and, at worst, creates system instabilities.

WinXP utilities like Disk Cleanup and System Restore can be helpful in keeping your system in good health, but the truth is that there's no substitute for a top-to-bottom OS reinstall to make your PC feel like new. It's called a "clean start," and on the following pages, we'll show you how to perform one with the highest level of personal customization possible. We first did this project in June 2000 with Win98, and because the article was so well-received, we decided to update it for WinXP. Our time-tested (and improved) *Maximum PC* process involves backing up all your valuable files, wiping your system clean, reinstalling your OS along with all your personal settings and favorite apps, then creating a mirror image of this perfect system profile on CD-ROMs. It'll include all your OS preferences, all your networking settings, and all the software you use on a daily basis—ready to load at any time, and ready to rescue you from disaster. Here's what you'll need:

- Windows XP installation CD
- PowerQuest *Drive Image 2002*
- CD-Rs or CD-RWs (at least three)
- A CD burner

After you're done, you'll be able to get that "fresh-out-of-the-shower" feeling anytime you want just by popping your recovery CDs and loading in your image. System feeling groggy? Virus attack? No problem. All you need is a clean start.

TEN EASY STEPS

Lest you get antsy about the sheer scope of this project, check out how easy the process really is. Here's a brief outline of what you'll be doing:

1. Confirm that you can boot from CD. Most PCs shouldn't have a problem booting directly off of a CD, but some really old motherboards may have issues with this, so it's best to check.

2. Back up your data. All your files will be wiped clean during this project. Sorry, that's the nature of the beast.

3. Collect the essentials. Before you recklessly reformat your drive, you're going to make sure you have all the tools required for the project.

4. Format your drive. This is the point of no return. Anything not backed up is about to be offered as sacrifice to the god of hard drives.

5. Install XP. This process is much easier than it was in previous Windows incarnations, but it's still the longest step here, so pay attention.

6. Windows Update. Microsoft's online resources will help you plug security holes and stomp out bugs.

7. Install drivers. Many people forget this step and end up wondering why their frame rates are in the toilet.

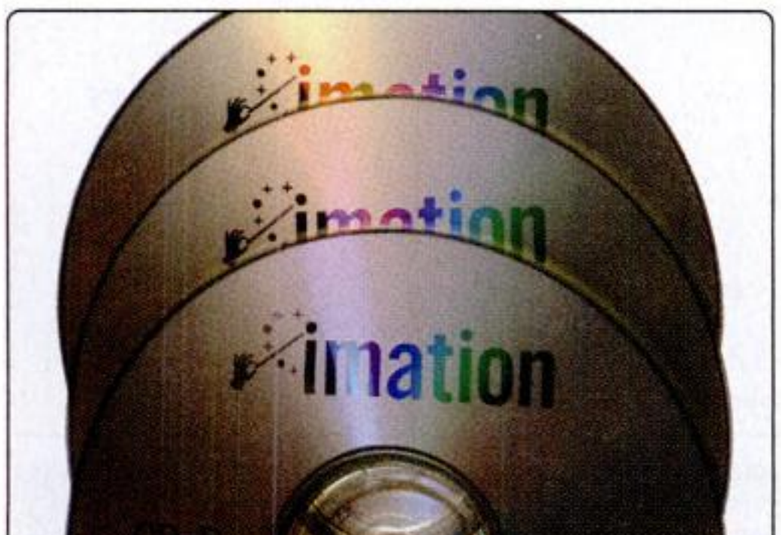
8. Tweak XP. Here's the part where you get to wring every last bit of performance from the OS.

9. Install apps. Your PC isn't going to be much use without some software to run.

10. Create restore discs. Finally, we're going to take a snapshot of your pristine, perfectly configured system.

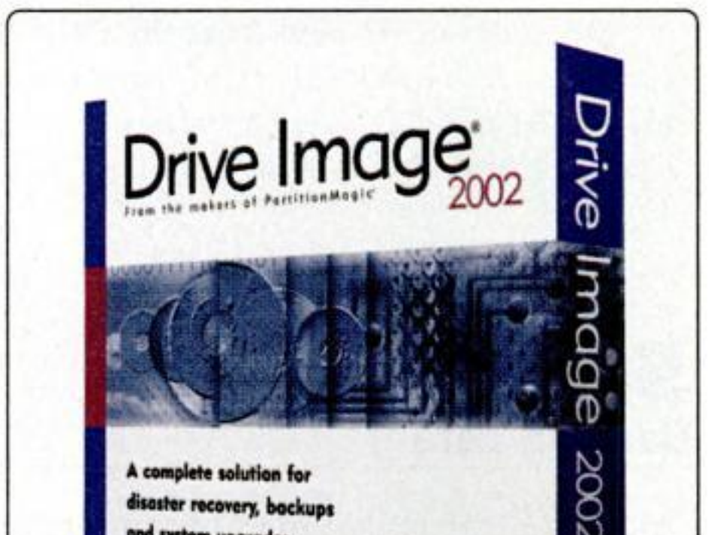
Stuff you'll need:

CD-Rs or CD-RWs (at least three)



Windows XP installation CD

PowerQuest Drive Image 2002


Drive Image 2002
From the makers of PartitionMagic
A complete solution for disaster recovery, backups and system upgrades
Drive Image 2002

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Clean Start!

STEP 1

Confirming that you can boot from CD

In order to restore your system without requiring a fragile floppy startup disk, your PC must be able to boot from a CD-ROM. Fortunately, almost all PCs that meet the minimum system requirements for WinXP are able to boot from the optical drive. Even so, you're still going to have to configure your BIOS so that your PC checks the CD-ROM for a bootable disc before turning to the hard drive. Here's how to do it.

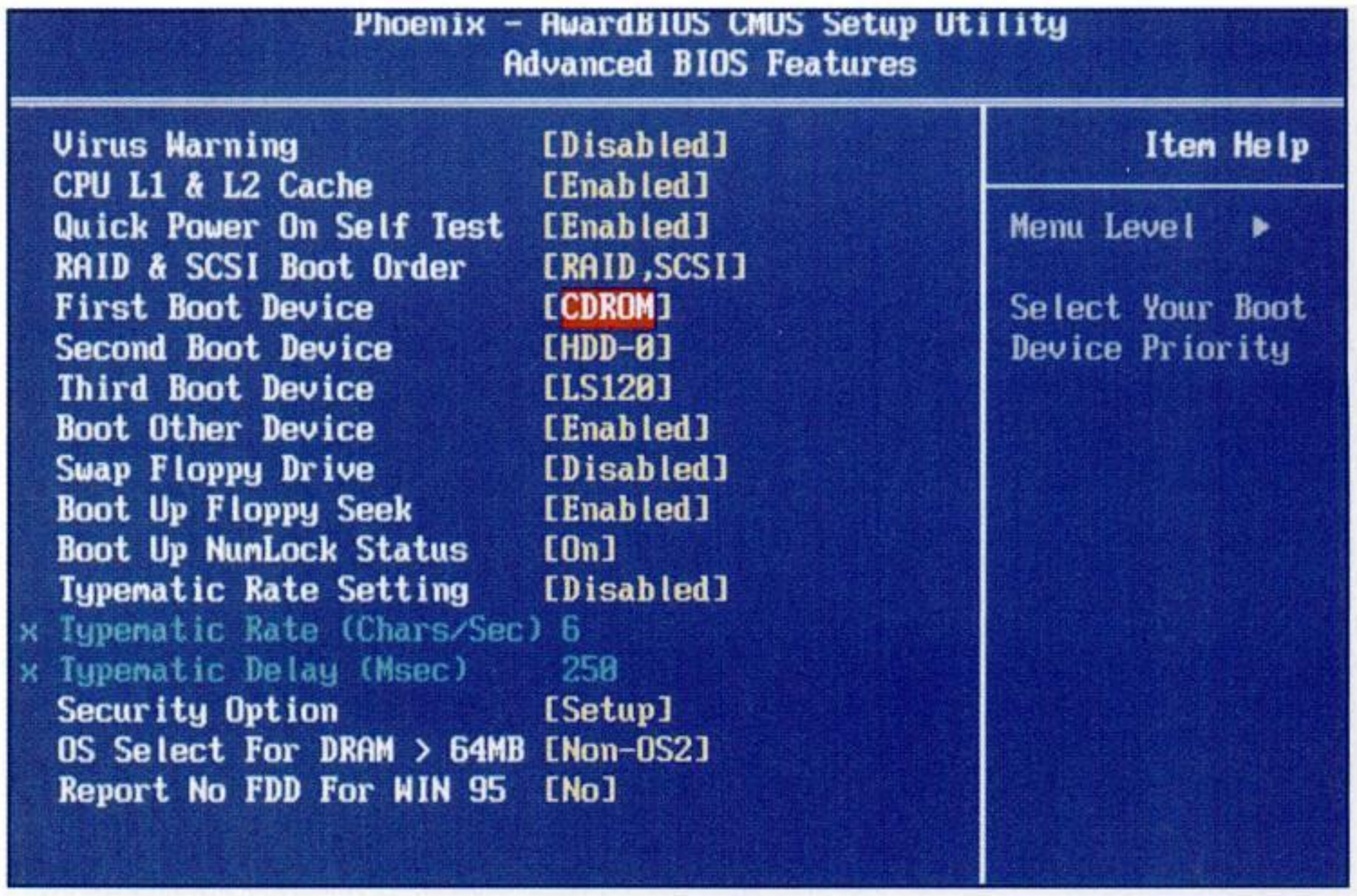
Restart your computer. As soon as the screen that indicates your BIOS is loading comes up, you'll have a few seconds to press the correct key to enter the BIOS. The name of the key should appear on the screen (e.g.,"Press F1 to enter the BIOS"), but if it doesn't, check your motherboard documentation. If you don't have a manual, try the Delete key. If that doesn't work, try pressing each of the function keys (F1, F2, etc.) and the Escape key until you hit the right one.

Once you enter your BIOS, check to see whether your BIOS is from Award or AMI by reading the title at the top. If you have an Award BIOS, enter the Advanced BIOS Features tab and scroll down to First Boot Device. It should be preset to Floppy. Because we aren't going to use the Floppy drive for boot purposes, press Enter, select CDROM from the list, and press Enter again. Now press Escape until you're back at the BIOS entry screen. Select "Save & Exit Setup" from the menu, and press Enter.

If your BIOS is an AMI, select the Advanced BIOS Features tab, scroll to 1st Boot Device, and use the plus and minus keys until you've selected CDROM. Now press Escape, select "Save & Exit Setup," and press Enter.

Once you've done all this, you should be ready to boot off a CD. If you can't seem to get the CD to boot, see the sidebar on page 35 for alternatives.

OK, I've confirmed that my PC can boot from my CD-ROM, and I've made the CD-ROM my first boot device. I'm ready to move on.


Phoenix - AwardBIOS CMOS Setup Utility
Advanced BIOS Features
Item Help
Menu Level ▶
Select Your Boot Device Priority
Virus Warning [Disabled]
CPU L1 & L2 Cache [Enabled]
Quick Power On Self Test [Enabled]
RAID & SCSI Boot Order [RAID,SCSI]
First Boot Device [CDROM]
Second Boot Device [HDD-0]
Third Boot Device [LS120]
Boot Other Device [Enabled]
Swap Floppy Drive [Disabled]
Boot Up Floppy Seek [Enabled]
Boot Up NumLock Status [On]
Typematic Rate Setting [Disabled]
x Typematic Rate (Chars/Sec) 6
x Typematic Delay (Msec) 250
Security Option [Setup]
OS Select For DRAM > 64MB [Non-OS2]
Report No FDD For WIN 95 [No]

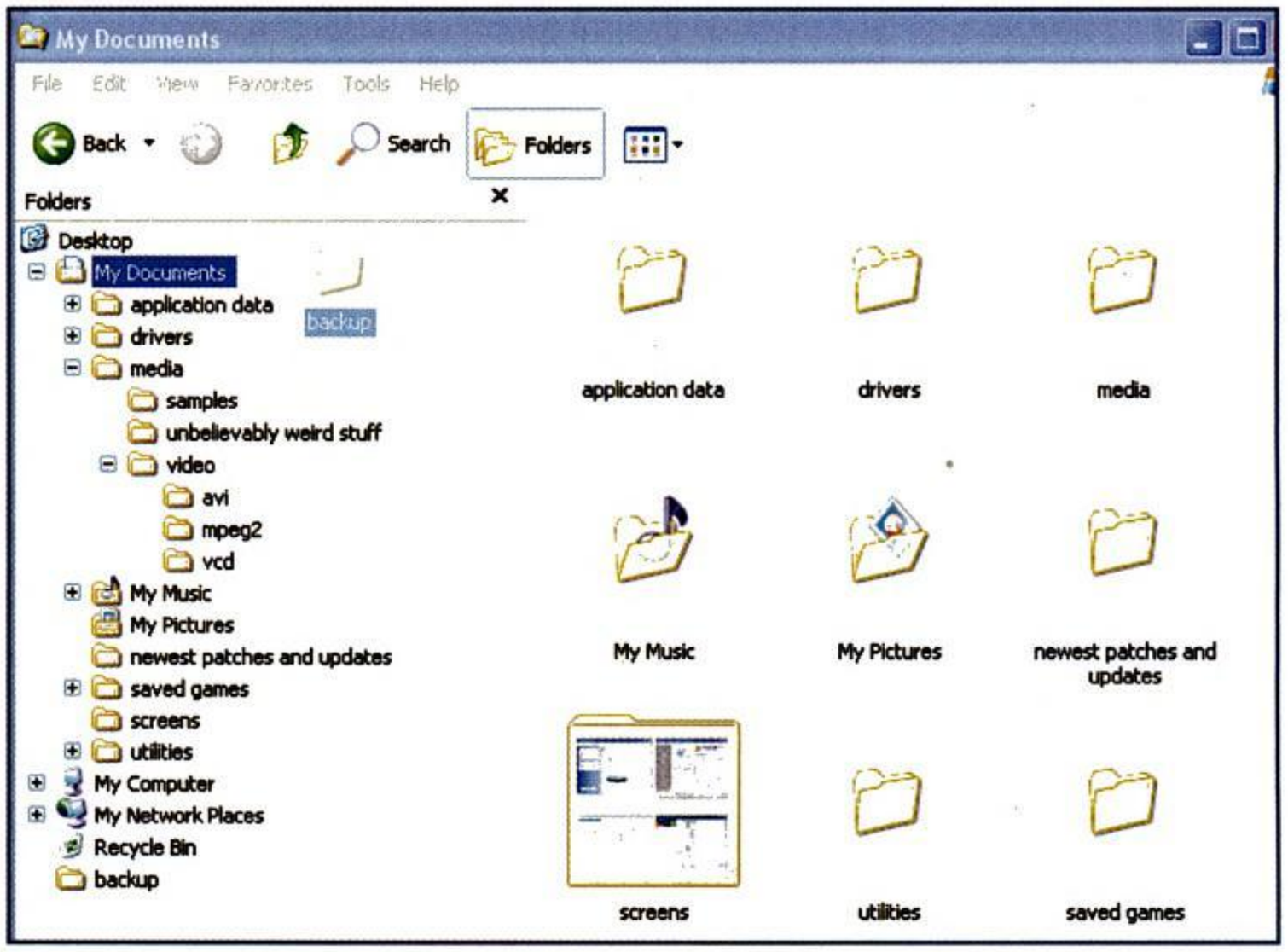
STEP 1 Once you're done with the "clean start" process, you can shave a couple seconds off your boot time by switching First Boot Device back to your floppy drive.

STEP 2

Back up data

Data backup can range from "quick and effortless" to "complete nightmare" depending on how organized your files are. If your personal documents are littered far and wide, let this be a lesson to you. Centralizing your data into one main folder—such as My Documents—can spare you the trouble of spelunking the depths of your system when you need to gather up coveted MP3s, JPGs, and AVIs.

Yes, you'll be tempted to use WinXP's Files and Settings Transfer Wizard. It purports to offer one-click backup of all the data you'll want installed on a new system. But trust us, it's not foolproof. The problem is that the wizard also transports all of the gunk—



STEP 2 Don't miss any important files during a backup, because you can't come back for them after you reformat.

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orphaned shortcuts, abandoned dialup configurations, and so on—along with your data and settings. This of course defeats the purpose of performing a clean install!

So let's get down to business. On your desktop, create a folder that will eventually be copied to either removable media or a secondary hard drive. Into this folder, copy everything from My Documents along with any sundry files you might have created on your primary hard disk, be they text documents, videos, or MP3s—anything you want to save for posterity. Make sure you organize the files into sub-folders, and as long as you've got the opportunity to tidy up things, make the most of it. Don't copy any personal document that you're sure you'll never need. If you have a secondary drive that's unrelated to the primary drive (that is, it doesn't have any software installed on it and will not require reformatting), then you can leave files there for safekeeping.

You'll want to export your e-mail, as well. In *Outlook*, this can be done by opening up Outlook and right clicking the Outlook Today icon in the list of mailboxes and selecting the "Properties for Outlook Today" option. Then click the Advanced button and copy the path from filename. The path will lead you directly to the file with all of your *Outlook* settings.

If you use a modem, you're going to need to copy down your ISP's phone number, as well as your username and password. This information can be found in Control Panel>Network Connections, but your password will be blotted out, so make sure you have it written down. Also, you'll need to record your username and password for any kind of broadband, such as PPPoE, that requires you to connect before using. If you use a static IP address, copy down all your IP settings, which can be found by going to Control Panels > Network Connections. Right-click Local Area Connections and select "Properties." In the new menu, highlight TCP/IP, click the Properties option and you'll find your IP info.

Don't forget your saved games! If you can't figure out where they're stored by browsing game folders, you can try uninstalling the game. Before the uninstallation process begins, many games will offer to keep the saved game files on your drive; these files can then be copied onto your new system when you reinstall the game. This isn't always going to work, though, so try first to find the right folder.

STEP 3 **The XP CD won't have the most updated drivers, so download the latest ones from your vendors' web sites, and put them onto a CD.**

✔ ***Alright, I've backed up all my data. I've double-checked that everything else on the drive is expendable. Yes, I'm sure. I'm ready to move on.***

STEP 3
Collect your project tools

It never hurts to double-check your tool box, because once you get moving, you won't want to be caught empty-handed. So make sure you have the following.

- *Drive Image 2002*, the program we'll use to create the restore disc set.
- Your original Windows XP installation CD (either Home or Professional).
- At least three CD-Rs or CD-RWs (it helps to have more on hand in case there are burning errors or you need more room).
- An optical disc that contains all the

The Clone wars

Alternatives to Drive Image 2002

Drive-imaging software isn't only for home consumers who want to make mirrored copies of their hard drives. System "cloning" is in fact a common procedure among IT managers who don't want to go through the hassle of manually installing a new OS on a bunch of identically configured machines.

Symantec's imaging software, *Norton Ghost*, has always been a popular choice among IT bosses because it allows them to scan networks for machines, then perform remote imaging on the hapless clones. The software also has numerous tools for controlling network data transfers.

PowerQuest's *Drive Image 2002*, however, is much more friendly toward people who just want to make images of their hard drive without mucking around in numerous DOS screens. For example, *Drive Image 2002* lets you restore your system image from within Windows, while *Norton Ghost* requires you to boot into DOS first. *Drive Image 2002* also has a much better interface and includes wizards for setup, image creation, and restoration. While we all have fond memories of our DOS days, we prefer to do our work in the comfort of Windows XP.

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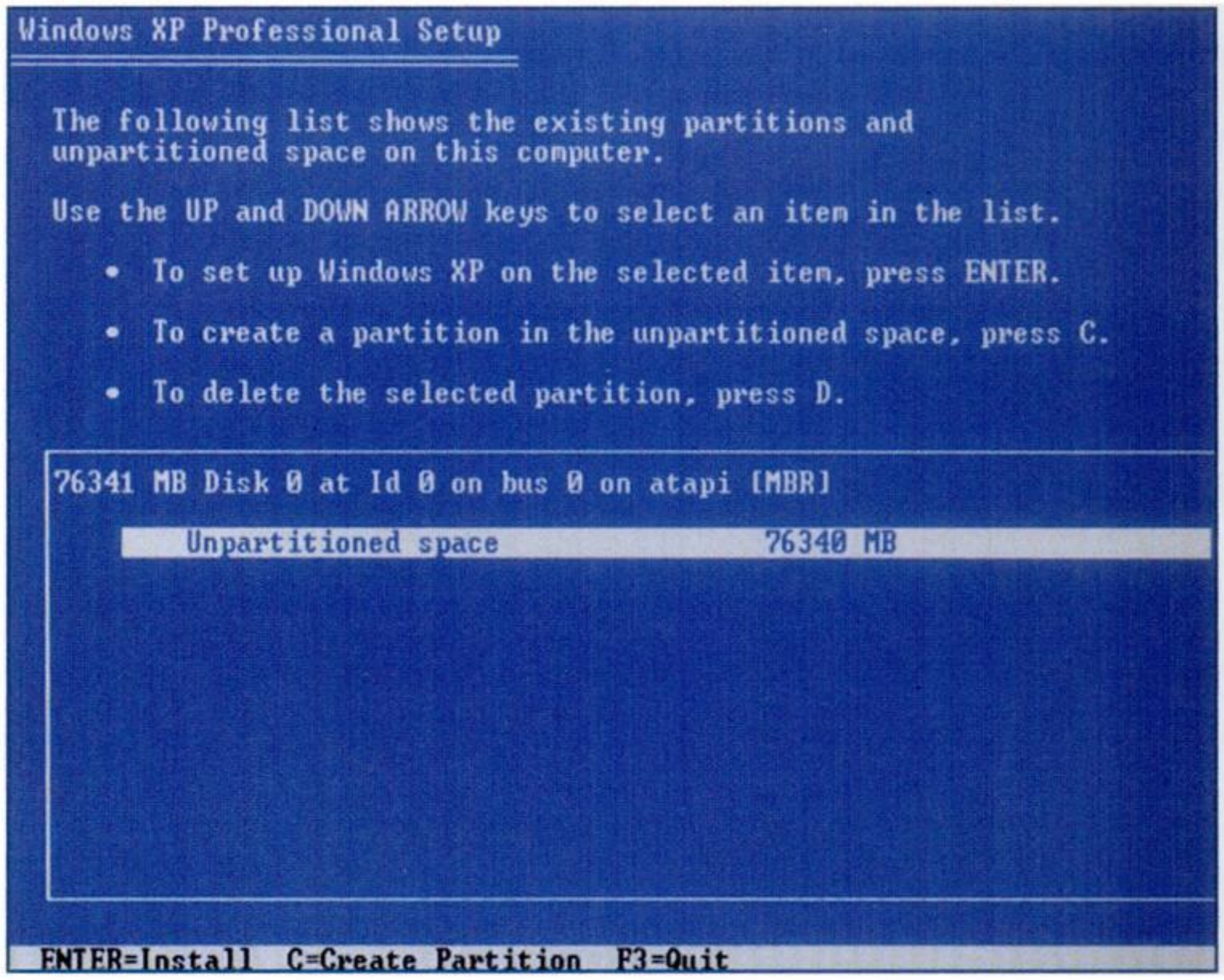
drivers you need for your hardware. We suggest that you go onto the Internet and pull the latest drivers from vendor web sites. Usually the driver you've got on your CD is old and moldy, or even Windows XP–incompatible in some cases.

Try not to forget any components, because any driver that you don't update now will have to be updated every time you reinstall. So make sure you've got the most current driver releases for your videocard, motherboard chipset, soundcard, network card, USB 2.0 card, printer, and any specialized A/V cards you might have. We keep all our drivers on rewriteable optical discs. This way they all stay in one place and can be updated as necessary.

We'll warn you ahead of time that drivers are not always going to be digitally signed. Digitally unsigned drivers aren't necessarily a bad thing as long as the company has a good reputation for making stable drivers.

You'll also need the original installation packages of all of the applications and utilities you'll want on your clean system mirror—*Office*, *Photoshop*, *ACDSee*, what have you.

Once you have all these parts collected, you can move on to the next step.


Windows XP Professional Setup
The following list shows the existing partitions and unpartitioned space on this computer.
Use the UP and DOWN ARROW keys to select an item in the list.
• To set up Windows XP on the selected item, press ENTER.
• To create a partition in the unpartitioned space, press C.
• To delete the selected partition, press D.
76341 MB Disk 0 at Id 0 on bus 0 on atapi [MBR]
Unpartitioned space 76340 MB
ENTER=Install C=Create Partition F3=Quit

STEP 4 Now that you've pooled all your disk space, it's time to create a partition.

I've got Drive Image 2002, my Windows XP CD, plenty of CD-Rs, all the latest drivers for all my hardware, and I know which apps and utilities I want to install. Now what?

STEP FOUR
Format your drive

This is it: the point of no return. Up until now, everything we've done has been simple preparation, but in this step you're going to actually erase files from your hard drive. If you've diligently backed up all your data, there's nothing to worry about.

Here's a final safety tip before we begin: If you used a removable drive to back up all your data and it's still connected to your PC, disconnect it now. When the XP install process begins and the formatting screen pops up, it will display the removable drive as the first partition. Many unhappy people have inadvertently formatted their removable drive—with all their backed-up data—instead of their hard drive. Whoops!

Drop the Windows XP CD into your optical drive and reboot. Since you've already set it up to be the primary boot device, you should get a message that says "press Enter to set up Windows XP." Do this. Once you're in Windows Setup, wait until a "Welcome to Setup" screen appears. Follow the instructions and press "Enter to Set Up Windows XP."

When the EULA (end-user license agreement) appears, press F8 to continue. If Windows is already installed on your hard drive, then you'll need to press Escape to bypass the previous install, and install a fresh copy. Next you should see a list of the partitions you have on your PC. Before you do anything, you need to develop a plan for the final configuration of your partitions. Partitioning is basically dividing the disk space of a physical drive among several "virtual" drives called partitions. These virtual drives show up as separate drives (C, D, E) within Windows. While many people like to divide their drives into multiple pieces, we recommend that you create a single partition for every physical drive you have.

Remember that there is no helpful redundancy in creating partitions, because if a physical drive fails, all of the partitions associated with the drive will die as well. It is also advantageous to create a single partition for your OS install because of the way Windows XP accesses its data. When a partition spans the entire disk, Windows XP automatically puts the large files onto the outside edge of the drive, where high seek times are mitigated by high throughput speeds. The smaller, more frequently accessed files use the inside edge of the disk platters, to take advantage of low access times. When you partition the drive into two pieces, you lose most of the advantages of this ordering scheme.

At the partition setup screen, find the partitions that are associated with your primary drive (Disk 0). Make sure this is the drive you want to format. If you have a physical hard drive that is 120GB, for example, and another 60GB physical drive that you backed up your old data on, look at the format screen and check the disk size—be absolutely certain that you are drawing a bead on the right drive. Once you're certain, delete them by pressing D, then Enter, then L.

Once this is done, you will have created a pool of all the free space on your hard drive and it will be ready for partitioning. Select the unpartitioned space, press Enter, and choose "Format the partition using the NTFS file system." For this task we want to avoid the Quick option since it simply rewrites the TOC to make the drive think it's empty instead of actually erasing anything. A full format goes through each hard drive

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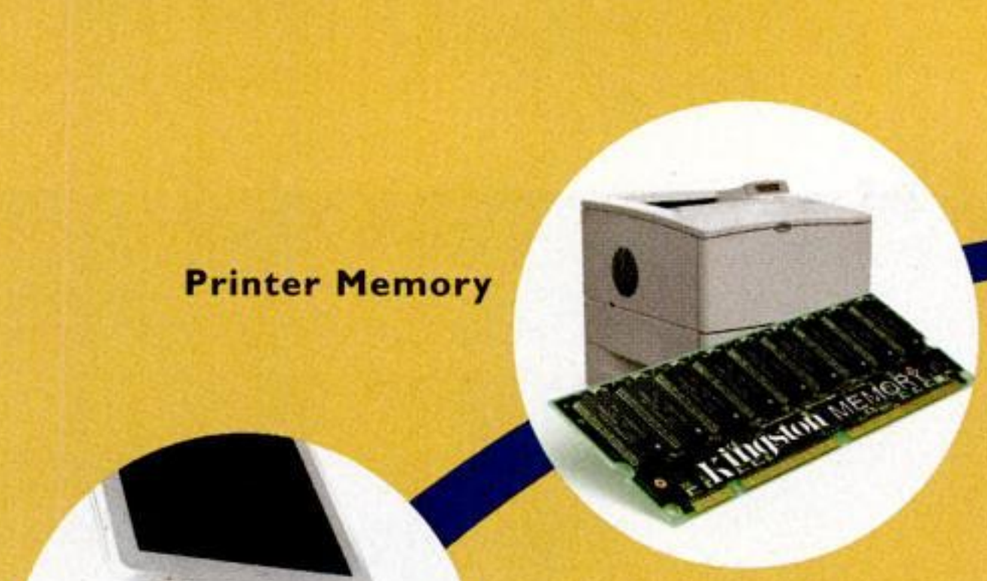

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sector and rewrites it, so if you have a bad sector on your drive, it will be exposed now rather than later.

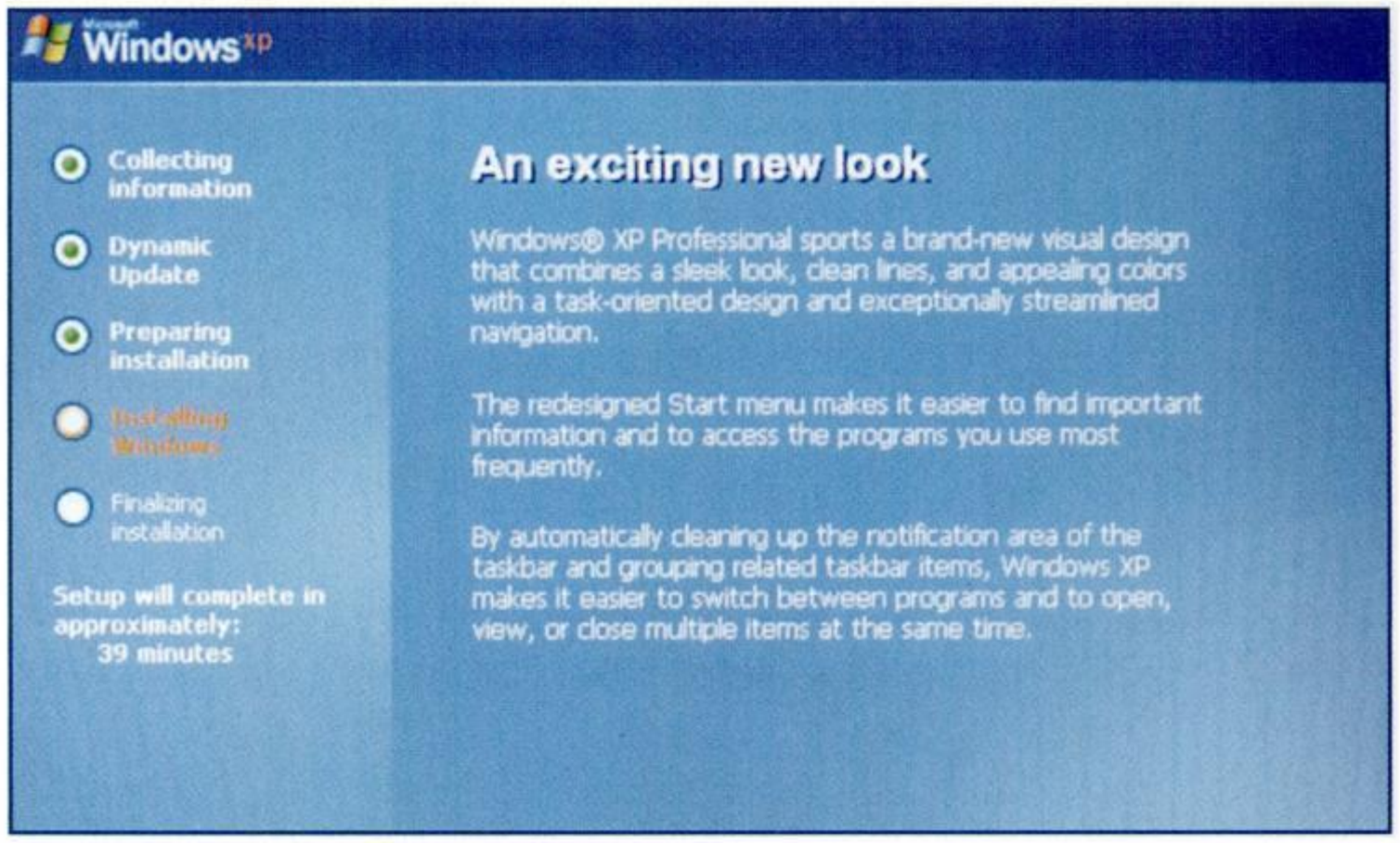
Now let the drive format. This will take a long time.

I've formatted my drive and deftly avoided disaster. Windows XP is now ready to install itself. No sweat.

STEP 5
Install Windows XP

After the format of your hard drive, your PC will reboot, and the Windows XP install routine will swing into action. You'll be prompted along the way for basic information, and asked to enter your Product Key.

After Windows XP asks for your desired network setup option for broadband and modem connections, the rest of the installation will progress automatically. When it has finished and rebooted, you'll be prompted to change your display resolution. Follow the onscreen instructions and allow Windows to boot into the familiar desktop. You'll also receive a message asking if you want to register and activate Windows. (Note that activation is required, but registration is not.) If Windows was able to recognize your network card and you use a broadband connection, then you can probably activate now. Otherwise, you'll have to wait until after you have installed the network card or modem drivers (see the next step).


Windows xp
Collecting information
Dynamic Update
Preparing installation
Installing Windows
Finalizing installation
Setup will complete in approximately:
39 minutes
An exciting new look
Windows® XP Professional sports a brand-new visual design that combines a sleek look, clean lines, and appealing colors with a task-oriented design and exceptionally streamlined navigation.
The redesigned Start menu makes it easier to find important information and to access the programs you use most frequently.
By automatically cleaning up the notification area of the taskbar and grouping related taskbar items, Windows XP makes it easier to switch between programs and to open, view, or close multiple items at the same time.

STEP 5 Installing XP is easy, just follow the directions onscreen.

Okey-doke, a fresh copy of Windows is now completely installed. What do I do next?

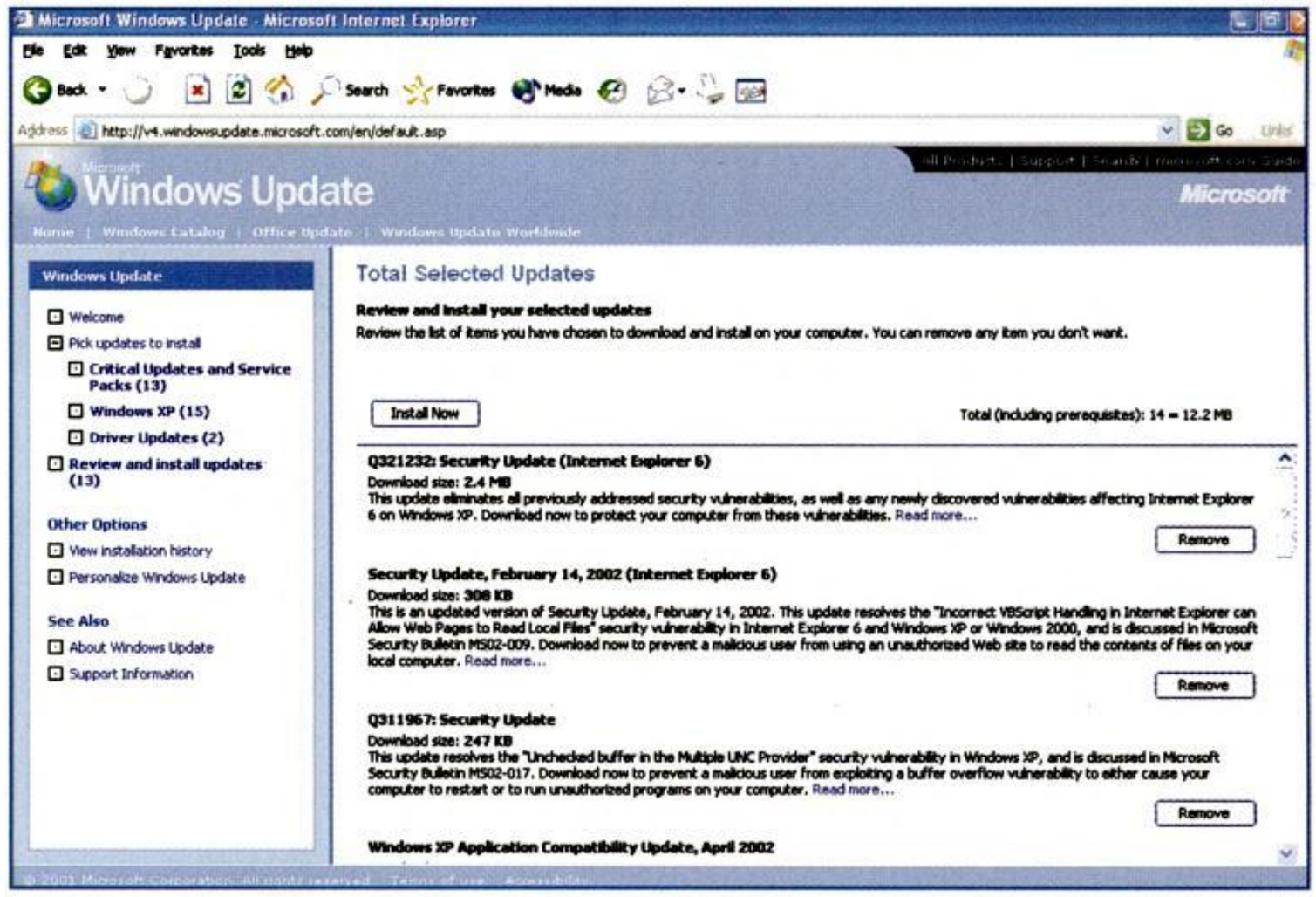
STEP 6
Run Windows Update

Our first stop after installing Windows XP is Windows Update, Microsoft's one-stop online shop for security fixes, OS updates, and certified drivers.

If you're using a network card and you connect through a standard DHCP broadband connection, then you can skip to the next part about running Windows Update. But if you're using a modem, or if you need to install specialized network parameters (username and password) from your broadband ISP to connect to the Internet, then we'll need to visit the Control Panel before going to Windows Update.

Go to the Start Menu and click Control Panel. On the left-hand side there should be an option that says "Switch to Classic View." Click this and you'll see the familiar set of Control Panel icons. Double-click Network Connections, and on the sidebar choose "Create a New Connection," choose the "Connect to the Internet" option, then "Set Up My Connection Manually." From here you can choose to connect through dialup or broadband with a username and password. Go through the desired menu selection and enter the information that you've copied down or that your ISP has supplied you with. After you're done, try to achieve a connection with your ISP. If you use a static IP, make sure you select that option in the Network Connection Wizard.

Once you're able to log on and access the Internet, go to the Start Menu on the Taskbar, select All Programs and click Windows Update. This will open an *Internet Explorer* browser that will automatically connect you to the Windows Update site. Once


Microsoft Windows Update - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://v4.windowsupdate.microsoft.com/en/default.asp
Go
Windows Update
Microsoft
Home | Windows Catalog | Office Update | Windows Update Worldwide
Windows Update
Welcome
Pick updates to install
Critical Updates and Service Packs (13)
Windows XP (15)
Driver Updates (2)
Review and install updates (13)
Other Options
View installation history
Personalize Windows Update
See Also
About Windows Update
Support Information
Total Selected Updates
Review and install your selected updates
Review the list of items you have chosen to download and install on your computer. You can remove any item you don't want.
Install Now
Total (including prerequisites): 14 = 12.2 MB
Q321232: Security Update (Internet Explorer 6)
Download size: 2.4 MB
This update eliminates all previously addressed security vulnerabilities, as well as any newly discovered vulnerabilities affecting Internet Explorer 6 on Windows XP. Download now to protect your computer from these vulnerabilities. Read more...
Remove
Security Update, February 14, 2002 (Internet Explorer 6)
Download size: 308 KB
This is an updated version of Security Update, February 14, 2002. This update resolves the "Incorrect VBScript Handling in Internet Explorer can Allow Web Pages to Read Local Files" security vulnerability in Internet Explorer 6 and Windows XP or Windows 2000, and is discussed in Microsoft Security Bulletin MS02-009. Download now to prevent a malicious user from using an unauthorized Web site to read the contents of files on your local computer. Read more...
Remove
Q311967: Security Update
Download size: 247 KB
This update resolves the "Unchecked buffer in the Multiple UNC Provider" security vulnerability in Windows XP, and is discussed in Microsoft Security Bulletin MS02-017. Download now to prevent a malicious user from exploiting a buffer overflow vulnerability to either cause your computer to restart or to run unauthorized programs on your computer. Read more...
Remove
Windows XP Application Compatibility Update, April 2002

STEP 6 You'll need to go to Windows Update often—your OS is a work in progress.

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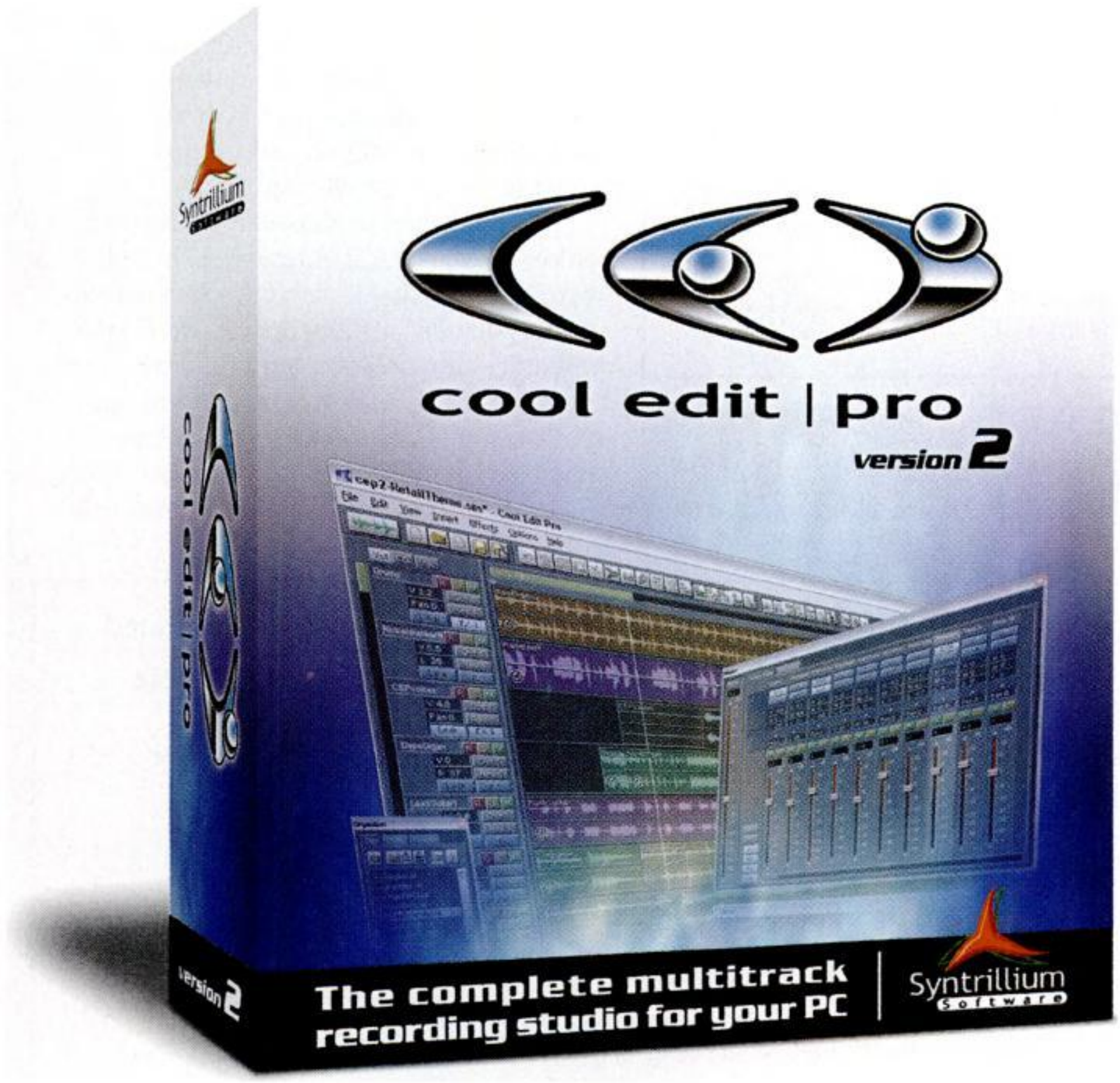

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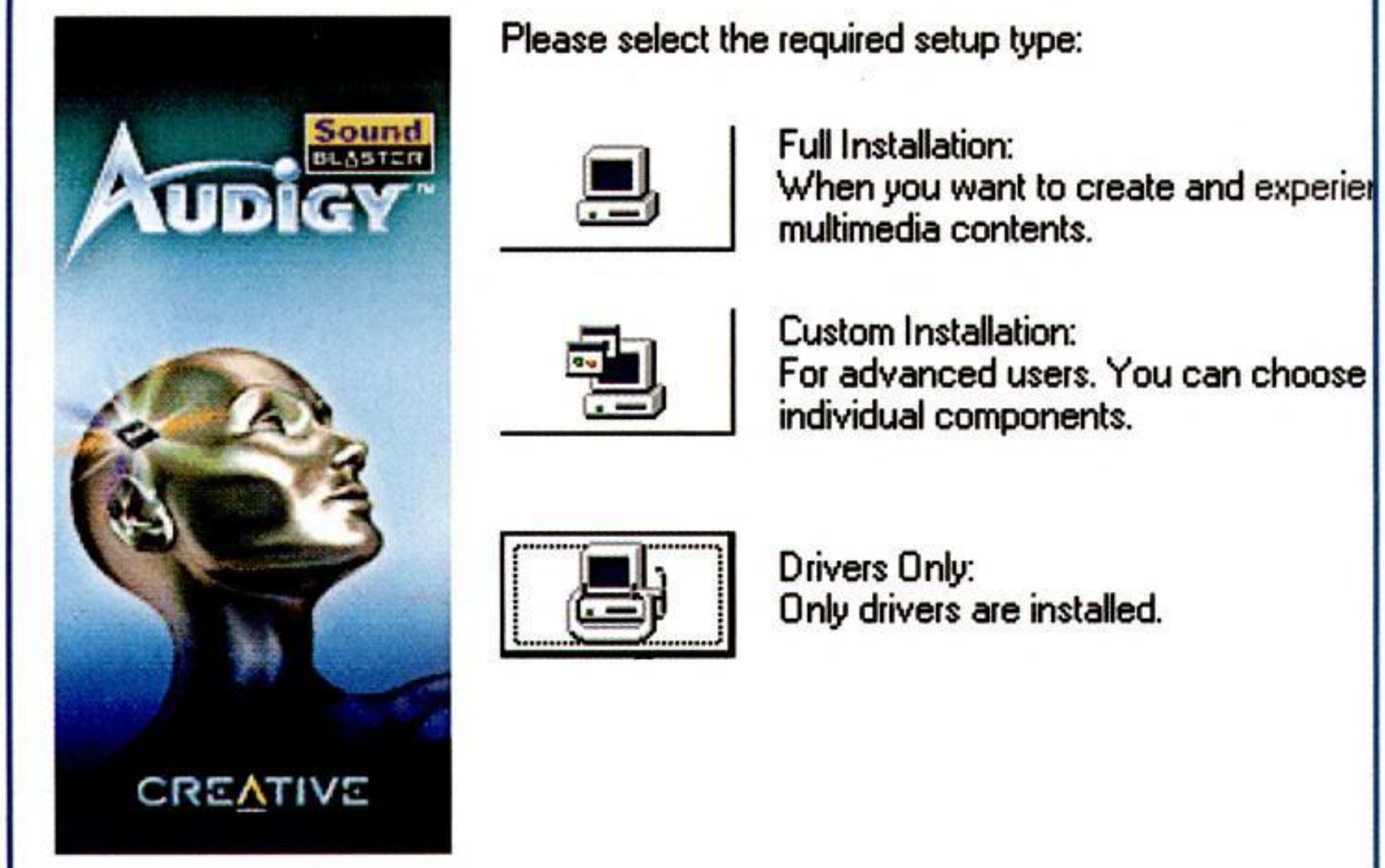


STEP 7 Whenever possible, select the leanest driver installation option—you can always add programs later.

STEP 7
Install drivers

As we discussed earlier, having the latest drivers is extremely important to a well-functioning machine, but you'll want to be careful with some of the stuff you put on your freshly installed OS.

Vendor driver discs tend to contain tons of extras that most people neither need nor want. Creative Labs, for example, packs a dozen or so programs with its Sound Blaster Audigy driver CD, and it all installs by default. So when installing from vendor driver packs, make sure you always select the minimum possible installation without all the extraneous software that's just going to muck up your pristine box. You can always add craplets later if you feel like you're missing out on something.

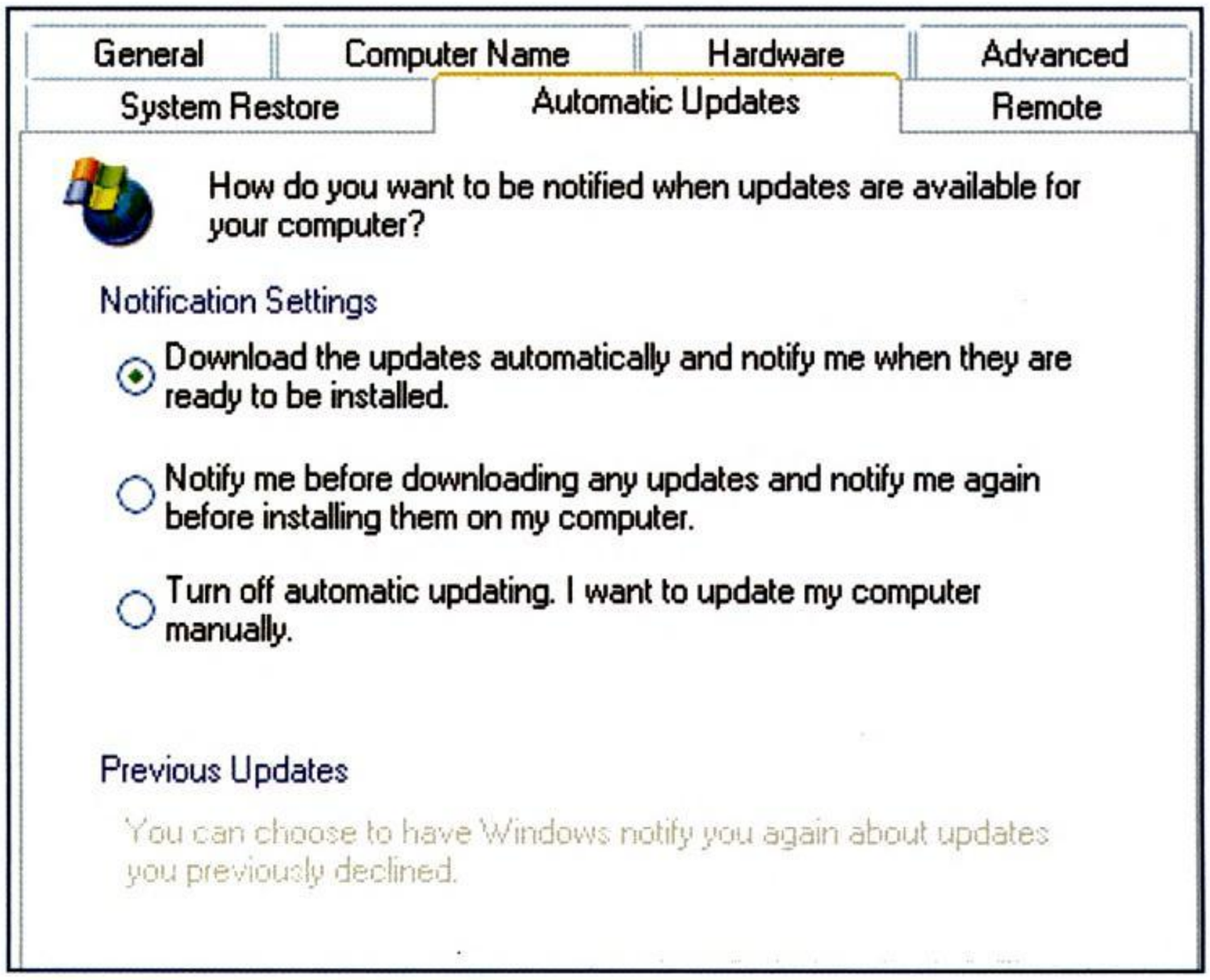
Most people use videocards based on either nVidia or ATI chipsets. Although your board maker may have a specialized driver pack, it's usually little more than a reference driver with a bunch of extra crap tacked on. To avoid this, just download the latest reference driver from either **www.nvidia.com** or **www.ati.com**. nVidia makes this especially easy by providing a

the page comes up, click the "Scan for Updates" option and wait while your computer is gently probed.

Once your computer is checked, you'll have three different categories of updates available to you. The first section is Critical Updates, which will automatically be selected for download. You can click on that section to review what is going to be installed, but it's best to just leave it alone and let Windows Update patch whatever security holes the hacking gurus have come up with this week.

The second section is Windows XP and it contains noncritical software updates for Windows. We recommend installing everything you think you'll need, especially the Microsoft Virtual Machine and all the recommended updates.

The last section is Driver Updates, and it contains a sparse list of WHQL certified drivers for your hardware. These drivers will usually be a bit older than the latest ones you can find on your vendors' web sites. You may want to go with the latest update, even if it isn't sanctioned by Microsoft.


General
Computer Name
Hardware
Advanced
System Restore
Automatic Updates
Remote
How do you want to be notified when updates are available for your computer?
Notification Settings
Download the updates automatically and notify me when they are ready to be installed.
Notify me before downloading any updates and notify me again before installing them on my computer.
Turn off automatic updating. I want to update my computer manually.
Previous Updates
You can choose to have Windows notify you again about updates you previously declined.

I've gone to Windows Update and brought my OS up to date. Are we done yet?

STEP 8 Take the time to customize your settings. This includes folder views, update notification, and display properties, among other things.

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unified driver that will work on any of its video chipsets since the TNT2.

Your motherboard chipset will probably be based on either an Intel or VIA chipset, although it may also be one from SiS, ALi, nVidia, or AMD. Check the vendor's web page for the latest driver updates. Having the latest chipset driver is far more important then most people think.

These days, most everyone runs a sound-card from Creative Labs, although there are some other vendors still out there, as well as a ton of integrated audio chips. For integrated audio, check your motherboard vendor's web site and you should be able to find what you need. Audio card drivers are usually available as downloads from the vendor's home page.

Once you're done installing drivers, reboot your PC and go on to the next step.

I installed all of the drivers necessary for my hardware, and I didn't forget to install updated chipset drivers for my motherboard. What's the next step?

STEP 8
Tweak WinXP

This is the final step in your OS installation. Here's where you turn Microsoft's Windows XP into *your* XP by customizing its configuration and tweaking the settings for maximum performance.

If you didn't activate Windows during setup, do that first by clicking the key icon in your System Tray. Windows will generously offer to take you on a tour, install a Passport account, etc. Click all these reminders, then cancel them right away if you're not interested. This will prevent you from being bugged about them every time you reinstall.

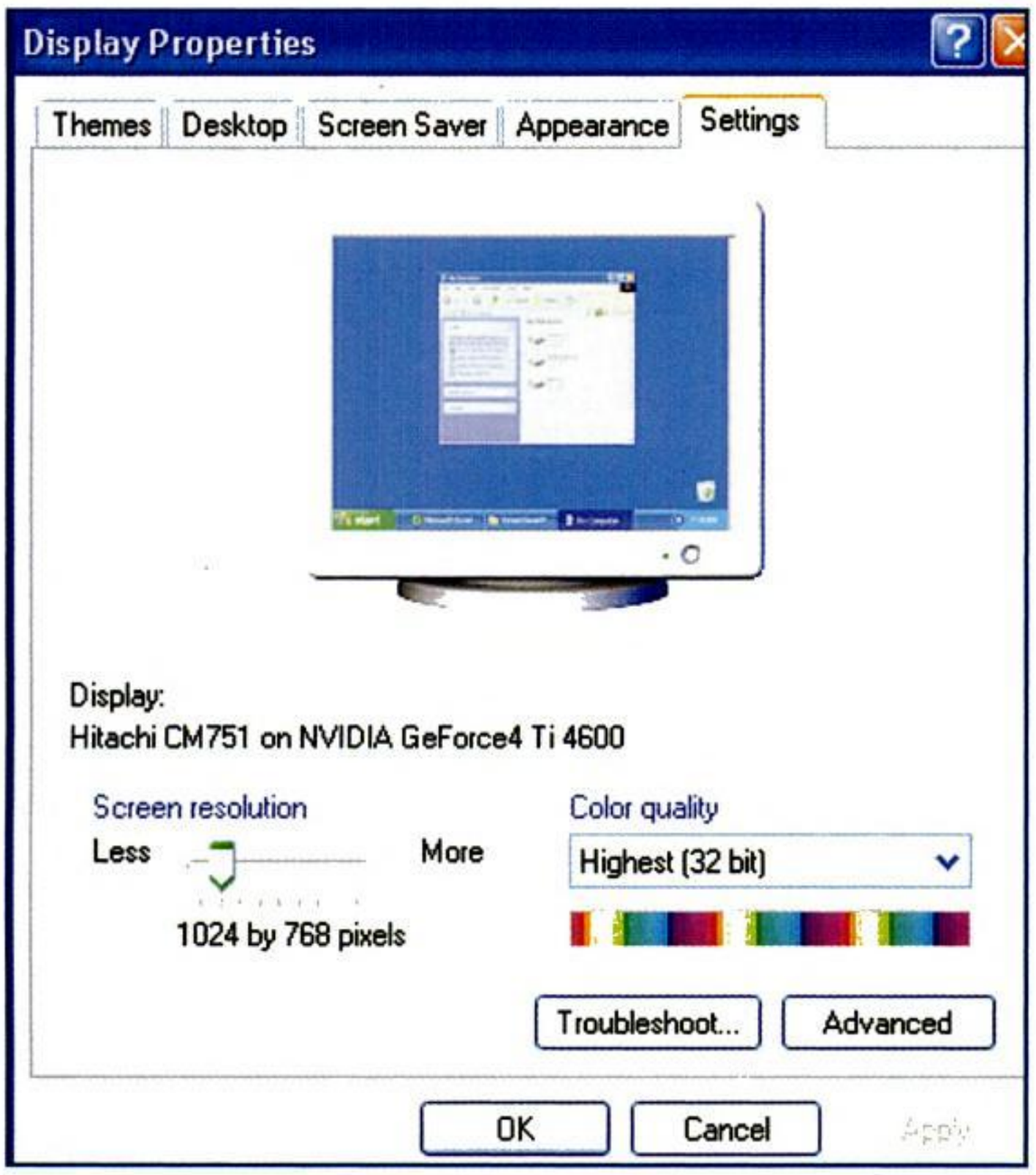
Change the display resolution if you haven't already. In fact, while you're in Display Properties, take the time to set your power-management settings and Windows décor.

Set up directories for your personal data within My Documents, so you'll have a fairly easy method of backing it up later. Tweak My Documents to reflect the view you prefer (we prefer to see file details, not icons, so go to the View menu and select Details). If you want, you can go to Tools > Folder Options, select the View tab, and apply these settings to all your folders by clicking "Apply to all folders."

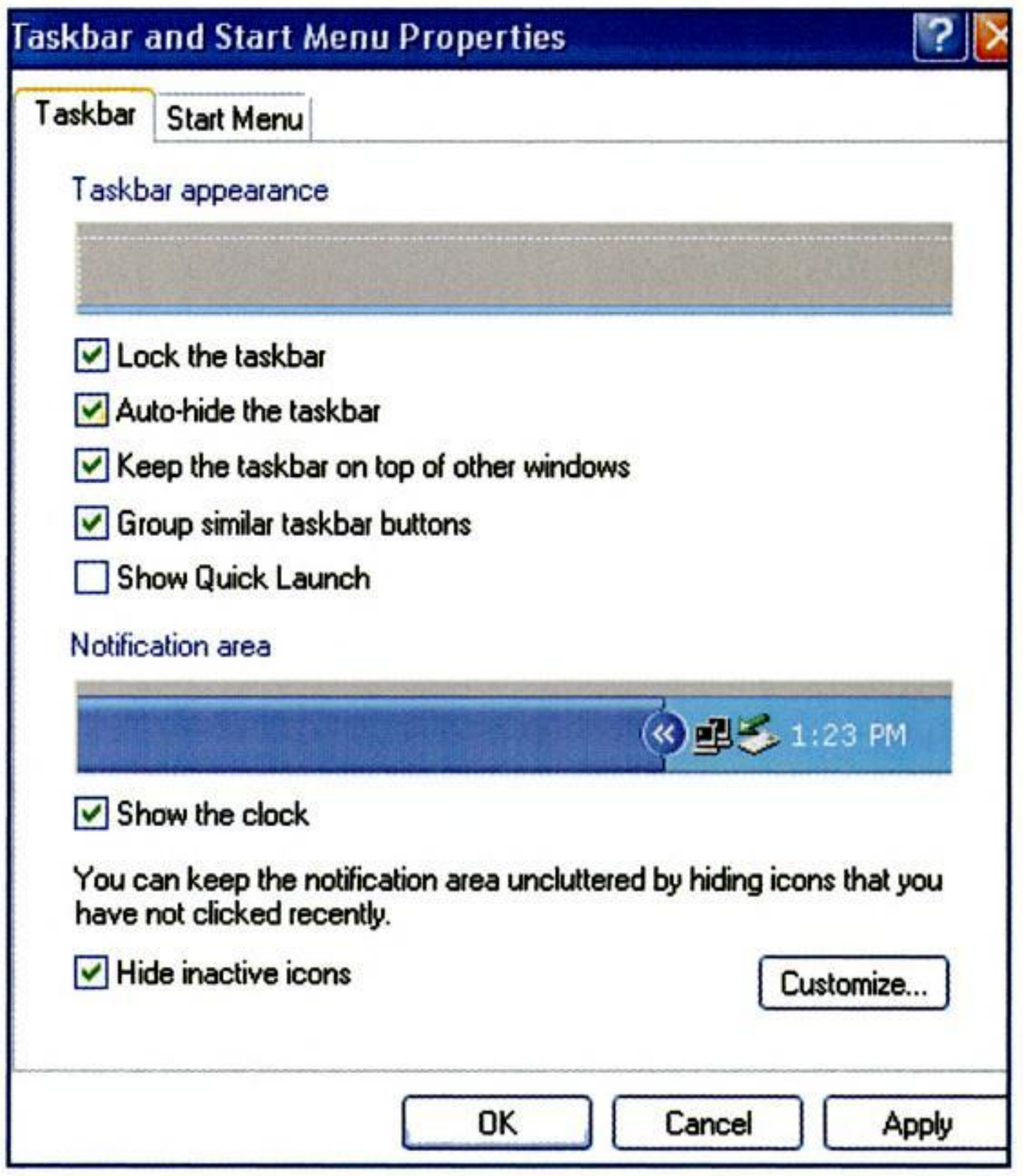
Next, right-click the My Computer icon on the desktop and select Properties. When the Properties window opens, select the System Restore tab and adjust the slider to the amount of disk space you want to allocate to System Restore. Also make sure you examine the "Automatic Updates" and "Advanced" tabs in order to set preferences for Users, Windows Update, Performance, and Startup. Don't forget to go into *Internet Explorer* and specify your security settings (at Tools > Internet Options > Security). If you plan on using a software firewall, you can configure that now as well.

If you prefer a more comprehensive, one-stop approach, check out programs such as *TweakXP* (included on this month's disc) that provide easy access to all the Windows XP tweaking options within one application.

Aye, Windows XP is tweaked to my tastes. No, I mean it. I've scrubbed through every dialog box and tab, including those within Internet Explorer, to reflect my preferences. Let's carry on.



STEP 8 Don't forget your display settings.



STEP 8 And always customize your Start Menu.

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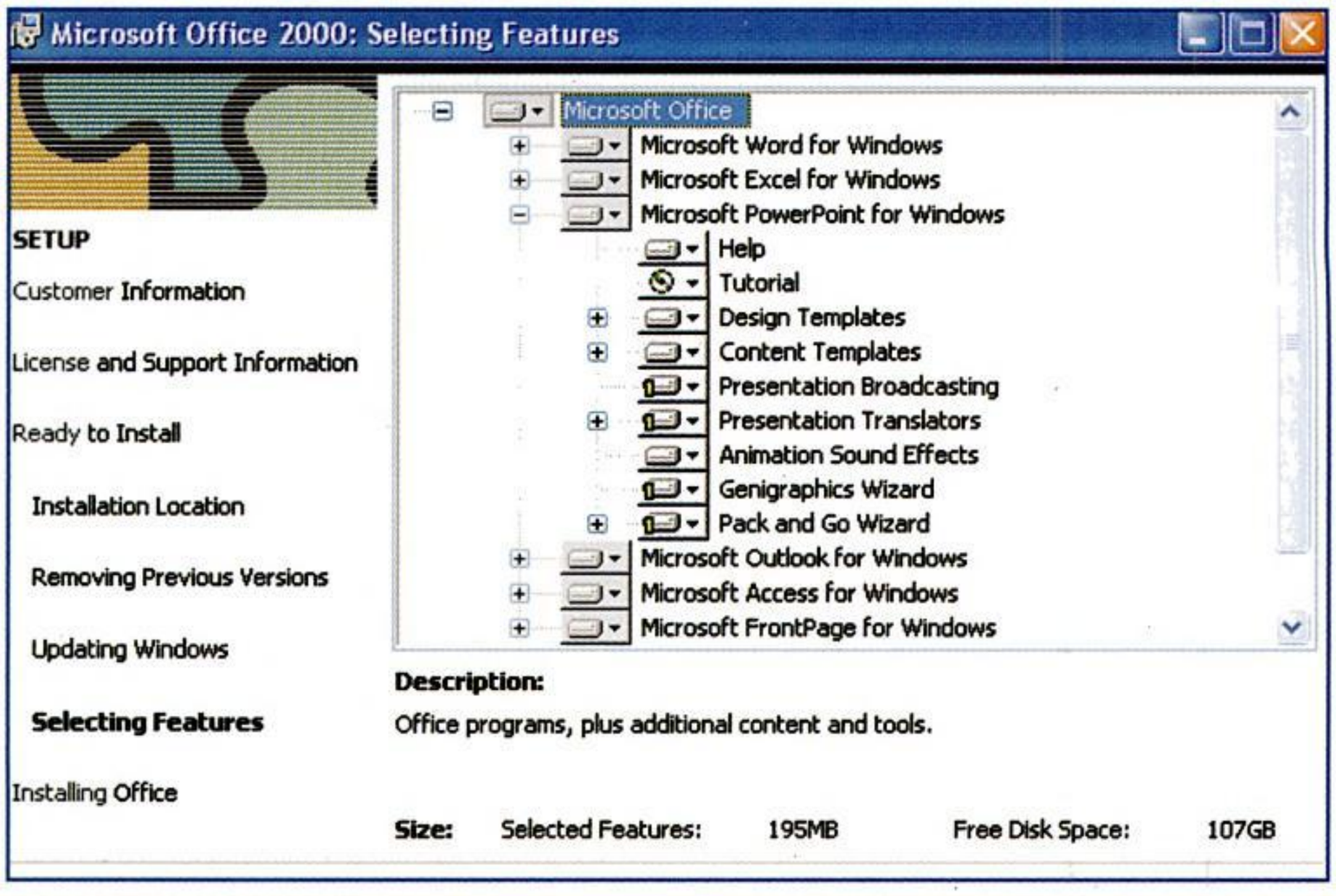
STEP 9
Install your applications

The final step in building your custom OS image is to install all the key applications you want loaded whenever you do a clean-start reinstall. These apps should be installed judiciously, so wherever possible, select "custom" installations and limit the modules and install packages to just the ones you know you'll want to use.

Avoid installing programs that are frequently updated. For example, we're perfectly happy with *Office 2000* and don't have any plans to upgrade to *Office XP*, so we're going to add *Office 2000* to our base install. But with something like an instant-messaging client, which is updated almost obsessively, we prefer to install the latest version each time we go for a clean start.

Before you move on to the next step, make sure you try running all your programs at least once to ensure that the installs were successful.



STEP 9 Feel free to install Office, but leave the more commonly updated programs until later.

I've installed all the applications that I want on my pristine system image. And, yes, I've ensured the installations are as minimal as possible, selecting only the modules that I'll actually use.

STEP 10
Create Restore Discs

You've gone through a long and tedious process to get here, but remember, you won't have to do it again for a long time. In this step, you're going to create the restore discs that will allow you to effortlessly refresh your system whenever you want.

Insert the *Drive Image 2002* CD into your drive, and run the setup program. Enter your username and serial number, and press Continue. When you come to the Install Customization screen, use the defaults unless you plan to back up using a Zip/Jaz drive or SCSI CD burner.

When asked if you want to create rescue discs, make sure you have two floppies ready to go. These discs will help you re-image your hard drive even if you can't boot into Windows.

After you create the rescue discs, label them and open *Drive Image 2002*. When the wizard selection menu comes up, check the box next to "Initial Backup Wizard" to continue with the default imaging process. Unless you want to modify the compression setting or tweak the amount of space that the images use on each CD, it's best to stick with the defaults. Compression is automatically set to high, which takes up less space but takes longer to compress when creating the image. It really doesn't make any sense at all to use no compression as it takes just a few extra minutes to make the initial images, and compressed images write back to the hard drive much, much faster than uncompressed images.

At the next screen, put a check mark next to your primary drive and insert a blank CD into your burner. When that's done, click Next, pick your burner from the list, and click Finish. Make sure all your programs are closed, then press the Yes button to restart the machine and begin the process. Your drive will now be compressed and written to disc. Follow the onscreen instructions to exit the program. Don't forget to label the discs consecutively when you're done. Well, golly, you've done it. You've made a complete image of a pristine system. Now, whenever you want a clean start, you can use one of the following methods to restore your system to its original state. *Remember that these processes will wipe out all your personal files, so make absolutely sure you repeat step two and back up all your data.*

RESTORING FROM WINDOWS (EASIEST AND BEST) If you want to re-image your drive and can still boot into your old install, the process is an absolute snap. Just open up *Drive Image* within Windows and cancel past the welcome screen. Insert disc one of your backup discs into the CD drive and click the Restore Image option. Click "Select Image File" and point it to the .pqi file on disc one. *Drive Image* will ask you to insert disc two, then disc one again—just follow the directions. Once that's done, click Finish, and insert the discs as requested by *Drive Image*.

RESTORING FROM CD If your PC just won't boot into Windows and you're loathe to use your set of floppies (if you even made them), then you can boot directly off the *Drive Image* CD itself. The CD will drop you onto the command line. When you see the A:\> on your screen type: `Y:\english\execute\pqdi.exe` then press the Enter key.

After the interface comes up, click the icon for Restore Image, then point it to disc one (which you should place in your drive now). Then just follow the instructions.

In case you were wondering, it's possible to make bootable CDs for your restore discs. But since you need the *Drive Image* program to restore the image anyway, why not just boot from its CD?

RESTORING FROM FLOPPY DISK This is the same procedure as booting from CD, except that you will not need to enter DOS. Pop in the first of two floppies you made when you installed *Drive Image* and reboot. *Drive Image* will ask for the second floppy, and start up its GUI automatically.

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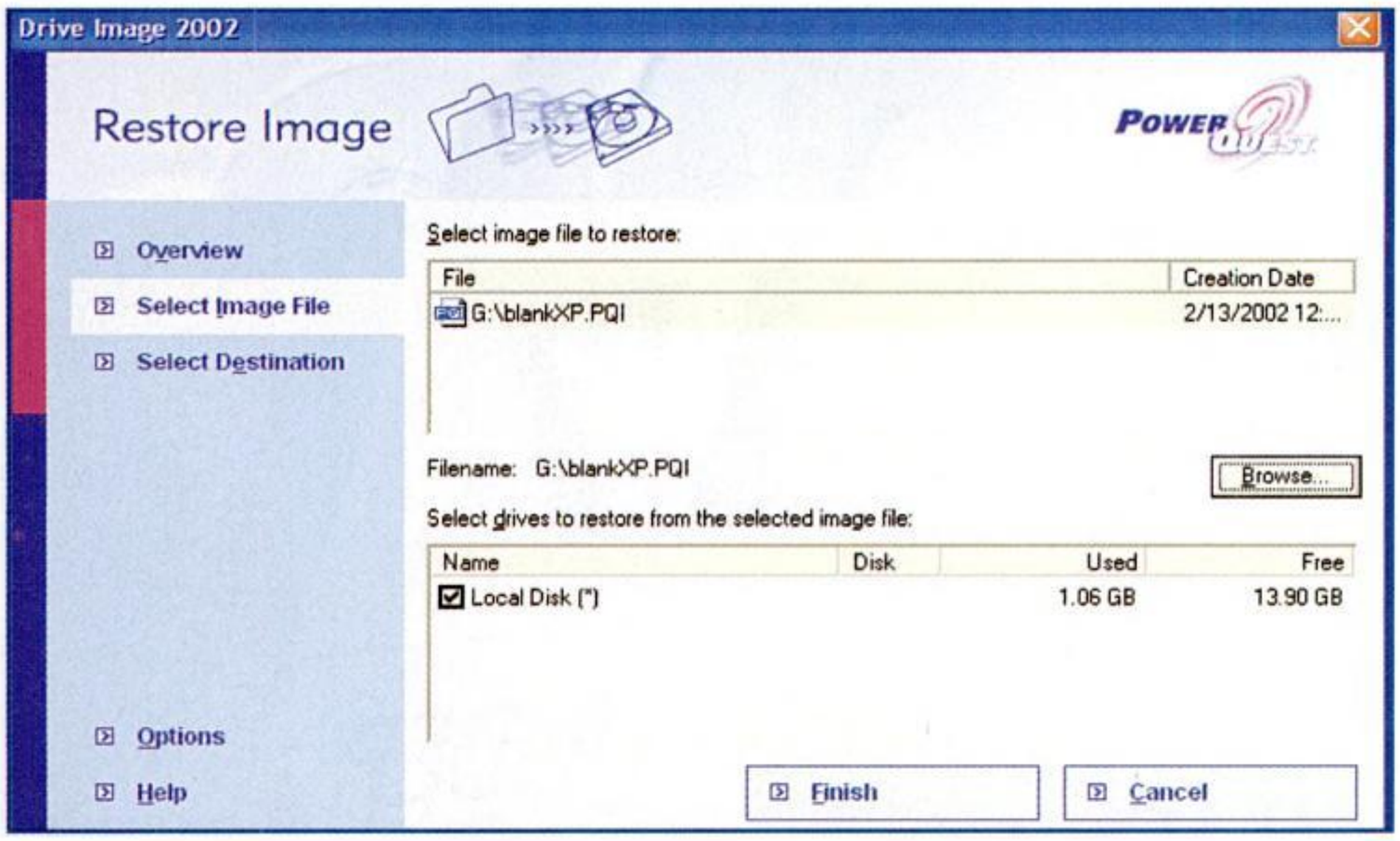

STEP 10 Select the image file you would like restored (you can have as many archived images as your drive can hold), and click Finish. *Drive Image* will take the reins from there.

Keeping your Windows clean

While even the most diligent housekeeper will find it impossible to keep a system absolutely free of data dust, there are still many ways to put off spring cleaning for up to six months or more, depending on your usage and degree of slovenliness. Your first defense is simple common sense. Be judicious and selective about software installation packages, customizing their installs wherever possible. Avoid installing programs that have extensive spyware—and that means most file-sharing P2P applications (unless you can find one of the unauthorized, ad-free "lite" versions online).

Even if you don't use any of the traditionally suspect software, you should still use (and update frequently) Lavasoft's *Ad-aware* (**www.lavasoft.nu**) to get rid of commercial garbage dumped into your Registry and system folders.

You can also avoid strangling the pipes with cross-linked files and file fragments by shutting down Windows the right way. Use the Start Menu > Turn Off the Computer selection. Shutting down by simply flipping off the power switch can lead to data loss, file corruption, and the little droppings mentioned above. Trust us, take the extra five seconds and shut down the right way.

Virus checks and regular defragmentation of your hard disk are also essential to keeping your PC in top shape. System maintenance packages like *Norton Utilities 2002* contain numerous tools for Registry cleaning, disk defragmenting, virus checking, and removing old files and shortcuts. Likewise, McAfee's *QuickClean* (available for Windows 95b through XP) is a stand-alone utility that blows out the garbage from all of Windows' hiding places, deletes duplicate files and orphaned shortcuts, and safely "shreds" these files on their way out. And the next time you get a message saying that the uninstall is completed but "some elements could not be removed," *QuickClean* steps in and removes them for you. At this point, we think that's something everyone can appreciate. ■

Tricky Disk

Booting the Old-Fashioned Way

Despite Microsoft's best efforts to bury the legacy of the command line, there are still times when you might need to go old-school and create a DOS boot disk. For instance, if your motherboard doesn't support booting from the CD-ROM and you have no intention of upgrading.

Windows XP does allow you to create a rudimentary MS-DOS boot disk (right-click your floppy drive, select Format, and check the option to add system files). But you won't have any CD-ROM drivers on the disk, nor any of the apps you might need like FDISK, Format, and even Edit. The best solution is to whip up your own custom all-purpose boot disk.

There's no need to reinvent the wheel, though—most of the dirty work has been done for you. Go to www.drd.dyndns.org and click the "Boot Disks" link. Scroll to the bottom where you'll find "Boot Disk Essentials" and click the download link (the red floppy icon). Then click on "wbootess.exe" to download it to your hard drive.

After it has completed downloading, put a disk into your floppy drive and launch the wbootess executable. Click OK, and the program will create a boot disk for you, similar to the Windows 98 boot disk, but with a greater assortment of standard tools. You will get a universal CD-ROM driver, a mouse driver, a copy of FDISK and more.

If you want more information on creating boot disks, or if you want to tailor your own custom boot disk, go to www.bootdisk.com. You can also download other users' custom disks for your own use. But be aware that you must possess a valid license of Windows before downloading a boot disk imaging program.

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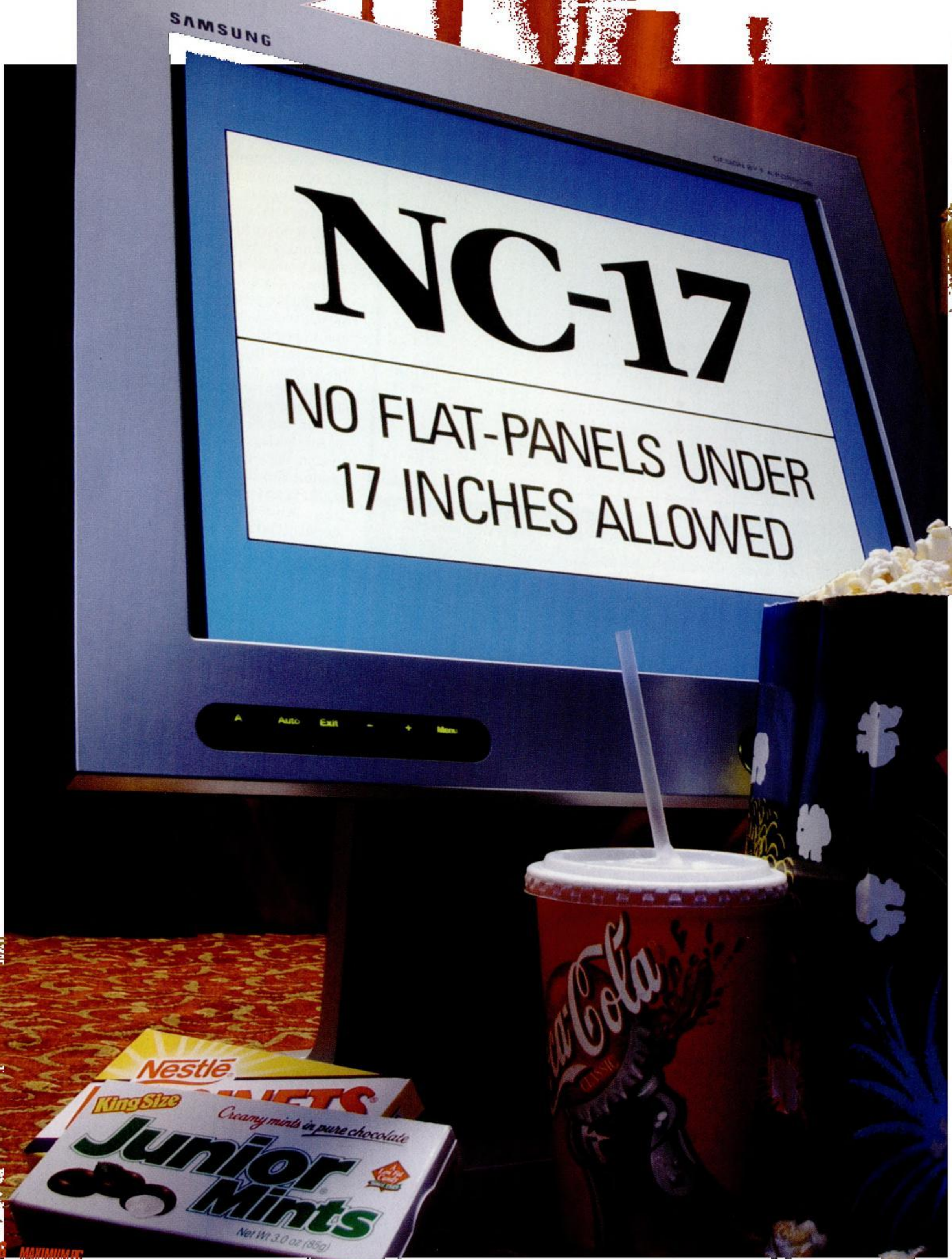

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Don't even step up to us with your small-fry, pre-adolescent, 16-inch display, because we've got our trusty yardsticks out, and we'll be checking screen real estate at the door.

The Maximum PC Film Festival is for adult-size LCDs—17-inches and larger—so baby-size monitors should just turn around and head home.

We've got good reason be strict: Big-screen flat-panels are eminently affordable, and you'd be a fool to buy anything smaller than 17 inches. The problem is finding the *right* big-screen panel, because, as we discovered while gathering product for this review roundup, everybody and his mama is selling LCDs these days.

The good news is that all modern LCD monitors—even the relatively bad ones—can kick the crap out of the best examples manufactured circa 1998. Old-school panels lacked pure digital interfaces, suffered terrible perimeter darkening, and often couldn't resolve 16-bit color (that's right: banding and dithering ran rampant). But the high-quality of today's panels illustrates just how far active-matrix TFT technology has advanced. In fact, every monitor reviewed on the next six pages should be more than sufficient for your daily, non-gaming, computer needs.

Nonetheless, some LCDs can pass our image-quality tests better than others, and not all are acceptable for hardcore imaging work, such as pre-press proofing and pro-level *Photoshop*-editing. So be prepared to see a lot of condemning verdicts in this showdown. We have to draw a line in the sand somewhere, and we see no reason to recommend even a good flat-panel if two or three similarly priced competitors offer better quality.

All of the panels in this roundup were tested on their digital interfaces. In fact, we didn't even plug the displays into our videocard's analog connector. Why? Because any videocard worth jack will come with DVI output, and analog connectivity can often introduce some amount of video noise to what *should* be a pristine screen image. You can consider this article our resolute stand against analog interfaces for LCDs.

We did play 3D games on the panels, but we're not reporting on how any of the monitors displayed gaming visuals. All of the panels in this roundup have a natural screen resolution of at least 1280x1024, and running them at lower resolutions requires pixel interpolation. This is a process that essentially "squeezes three pixels into two," if you will, and results in blurry, soft-focus visual quality. There's no reason to run lower resolutions for desktop work, but many complex 3D games can only run comfortably at 800x600 or 1024x768 on today's videocards. So if you run at these resolutions on a 1280x1024 LCD, you get a bad case of the blurries. Bottom line: Don't buy a flat-panel if you're a full-time gamer. That said, during casual game testing at 1024x768, we did find that all of the panels had fast enough pixel response to play *Ballistics* without undue streaking. DVD video playback was equally unblemished

That's it for the trailers, folks. At this point, you might want to visit our snack bar, because this is a six-page screening and there will be no intermission.

—JON PHILLIPS

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Testing Criteria: Eye-Witness Evaluations

All testing was conducted with a Visiontek GeForce4 Ti 4200 videocard set to 32-bit color. The panels that ran 1280x1024 were tested both individually as well as side-by-side, four at a time, with the help of an Inline DVI distribution amplifier (www.inlineinc.com). This allowed us to see how four different panels displayed the exact same desktop content.

To test grayscaling prowess, we used the LCD Test Script in *DisplayMate* (www.displaymate.com). The script runs through a series of screen patterns that are specifically designed to evoke a monitor's most subtle flaws. To test real-world image quality, we used two high-detail TIFF files. One was a portrait shot of tech editor Will Smith. His rosy cheeks are full of continuous skin tones that are especially difficult to resolve on an LCD display. We also used an extremely high-detail picture of a motorcycle helmet; the picture was provided by Sharp to illustrate the benefits of the company's 10-bit gamma correction. The key to this image is its hidden detail: On the helmet's curved surface, there's a reflection of the image's photographer, standing behind his tripod, shooting the photo itself. In most cases, some type of gamma adjustment (either monitor-based or videocard-based) is required to see this hidden reflection. We're absolutely confident that the TIFF isn't "optimized" for Sharp's own display—read the review, and you'll see why.

All tests were conducted at each panel's natural resolution. If you want to know about a panel's interpolation abilities, go read a magazine that believes interpolation is a legitimate option. For more information on how we test LCDs, read the Benchmarking section at www.maximumpc.com.

Some type of gamma correction is required to evoke the hidden image of the photographer in this picture.

NEC 1880SX

For a panel afflicted with beige-paint disease, the 1880SX is vaguely attractive in a kitchy, retro sci-fi kind of way. Who knows, if 18-inch flat-panels hadn't of cost $108,000 a pop in 1973, you might have seen something like the 1880SX in Woody Allen's *Sleeper*.

Like the Sharp, EIZO, and Iiyama panels, the NEC has an extremely thin frame, so it's the perfect candidate for sitting shoulder-to-shoulder with an identical twin in a dual-monitor setup; your 2560x1024 desktop would appear as a near-contiguous expanse of screen real estate. Darkening around the perimeter of the screen? Nada. Times New Roman text reproduction? Fine at 9-point and above. Grayscaling? Very good, but not 100 percent perfect. In *DisplayMate's* 256-band grayscale intensity ramp, the monitor was unable to render the ramp's perfectly linear gradation; there was a noticeable darkening of a few bands at around 75 percent gray. The anomaly appeared regardless of the ramp's orientation on the screen. Still, this is the kind of flaw that's patently visible in *DisplayMate*, but may never actually reveal itself even after hundreds of hours of real-world computing. In other grayscaling test screens, the NEC kicked ass.

NEC: Completely lacking curved surfaces, the 1880SX's design requires the right desk décor to blend in.

Extremely dark gray blocks were visible against 100 percent black, and light grayscale contrast was almost as good.

When it came to real-world skin-tone rendering, the panel fell in the same class as the EIZO, but just short of the Sharp: Amazing detail, but noticeably saturated. And in the scope of this roundup, the NEC did noticeably better than most of the other panels in displaying the hidden reflection of the photographer in our high-detail TIFF. It couldn't match the default detail of the Iiyama, but it did display *some* of the reflection, and that's saying something. Plus, its screen quality had none of the washed-out pallor of the Iiyama.

The 1880SX isn't the best panel in the roundup, but it's still extremely sweet, and the only one that features an analog connector in addition to two DVI connectors.

VERDICT: 9

www.necmitsubishi.com, $1,300

Planar PV174

You get what you pay for. Right out of the box, this 17.4-inch panel couldn't resolve the hidden reflection in our high-detail TIFF, and no amount of control tweaking could conjure up the reflection—because the image control is limited to brightness and contrast adjustment! That's it! That's all you get! Still, at just $750, this panel exhibits relatively good screen quality, so we have to give it sympathy props.

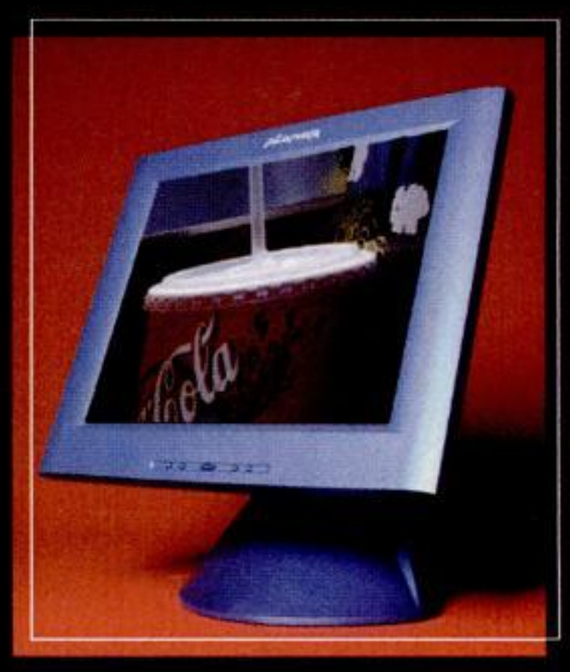
There was no darkening around the screen perimeter, and while skin tones in our high-res test images looked over-saturated (giving Will Smith a mild case of eczema, which we can promise you he doesn't have), overall image quality was pleasing. Like most of the displays in the roundup, the Planar offers markedly better image quality than almost any LCD we would have reviewed two years ago.

During *DisplayMate* testing in the 256-level intensity ramp, every 16th grayscale gradation was punctuated by a faint spike. That said, there were none of the severe compression problems that we saw with the Iiyama: The lightest band appeared to be pure white, the darkest appeared to be pure black, and the ramp scaled in a relatively linear fashion (aside from the 16 subtle spikes). Times New Roman text looked fine at 9-point but not at 8-point.

We're not fond of the extremely wide plastic frame (so very last millennium), and we're still trying to figure out where this panel hides its speaker grilles. And we'd prefer a much more robust control set. But did we mention it costs just $750?

VERDICT: 6

www.planar.com, $750



Planar: With a big, brash, silvery chassis, the PV174 would probably appeal to the "big muffler and chrome wheels" crowd.

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BenQ FP2081

With 192 square-inches of screen real estate, BenQ's 20-incher offers the exact same property value of a 21-inch CRT, along with a default 1600x1200 resolution and superb visual quality to boot. In *DisplayMate's* grayscaling tests, the BenQ was as good as nearly any panel in the roundup. It didn't reign supreme in resolving the darkest grays against pure black or the lightest grays against pure white, but its performance in the 256-band intensity ramp was smooth and true, and lacked compression.

The panel rendered skin tones with a level of clarity that flirted with the best that CRTs have to offer—confidence-inspiring, though the gradations were a bit more saturated than the output from the Sharp. At its default settings, the BenQ could only render a hint of the hidden reflection in our high-detail TIFF; no gamma controls were available to evoke anything further. Pity.

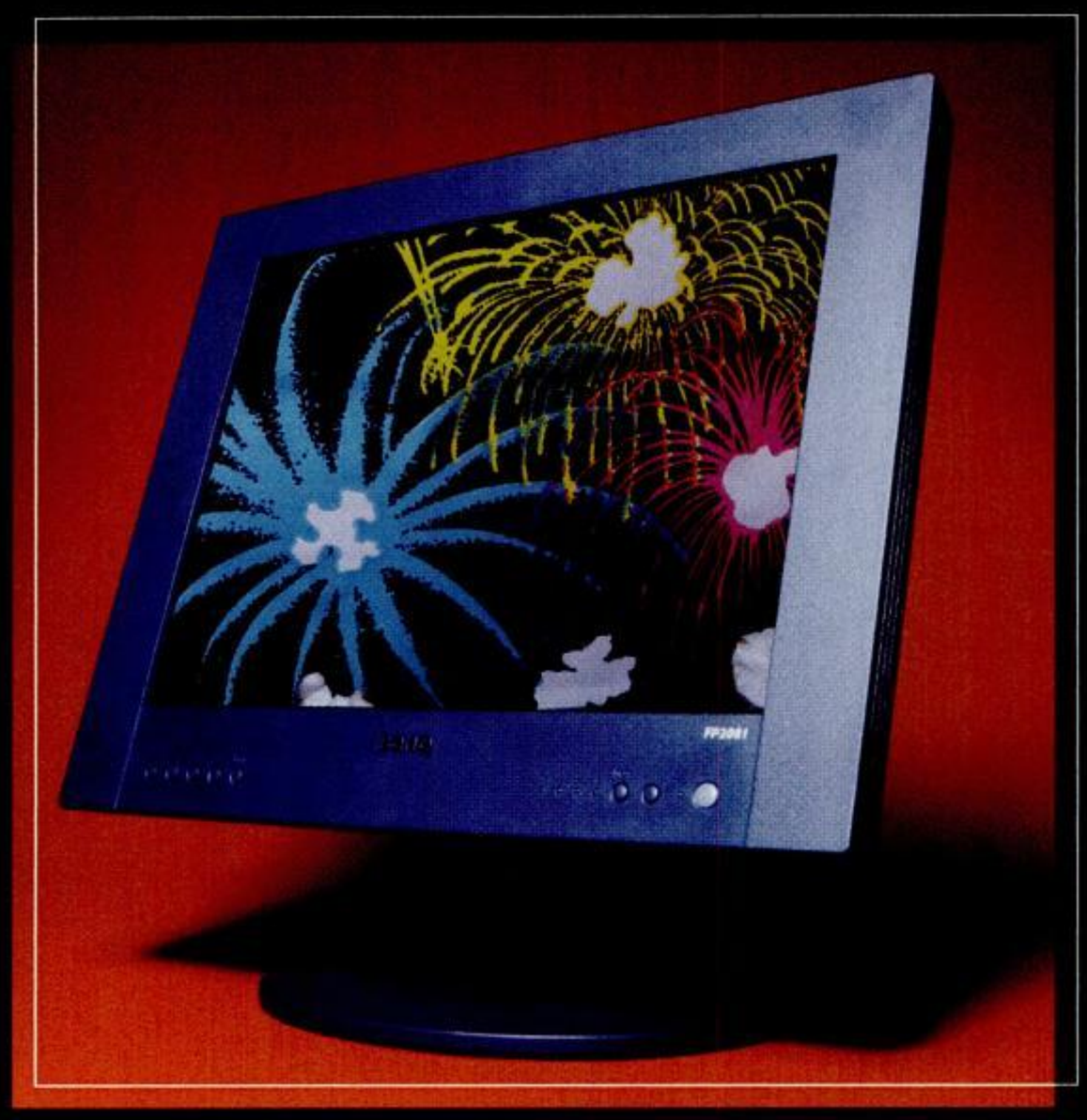
Text reproduction was incredible, with distinct letterforms down to 8-point in Times New Roman—the best text reproduction in the roundup according to our subjective eyes. For this you can thank the BenQ's dainty 0.255mm pixel pitch. Smaller pixels equal greater definition, it's as simple as that. So always go for the lowest pitch spec possible if you want to survive an eye-straining workweek.

Given the BenQ's generous input options, you might even be able to justify the panel to your company's stingy IT department. Besides the requisite analog and DVI inputs, the panel also includes inputs for composite video and S-video, making it appropriate for, well, whatever content the corporate types might need to present during their rah-rah *PowerPoint* seminars. But at *Maximum PC*, we can find better uses for the extra inputs, like feeding the S-video input with a DVD stream, then running movies in the panel's Picture-in-Picture mode. The PIP screen has just three preset sizes, but it can be adjusted for hue and saturation, and placed anywhere onscreen. S-video output was stricken by subtle wavy lines, but for this we blame typical signal noise, not the BenQ display.

The BenQ may not have the most exacting image control, but its text reproduction, sheer size, and PIP options make it perfect for anyone who does normal desktop work.

VERDICT: 9

www.benq.com, $2,000



BenQ: The FP2081 offers the exact same screen size as a 21-inch CRT, but is thin enough to fit on any desk.

Samsung 171P

The chassis of this 17-inch Samsung panel proudly announces "Design by F.A. Porsche." That would be the same F.A. Porsche who penned the lines of the original Porsche 911 sports coupe. Now, whether this panel shares any aesthetic DNA with the 911 is debatable, but we can tell you that the 171P is *not* the ultimate in precision engineering in the world of LCD displays.

The panel's analog and DVI cables are permanently attached to the pedestal. This is a rather short-sighted design feature because it means you can't easily swap out cables should one go south. And sure enough, the cables on our particular review unit were crimping where they connect to the pedestal, leading us to wonder how much twisting they might bear. We got even more worried when the panel's picture darkened all of a sudden. Luckily, the screen stabilized after a repositioning and reboot, and we were able to rerun *DisplayMate*, this time without interruption.

Grayscaling tests revealed a minor inability to render the darkest grays against a pure black background, but we doubt the problem would ever be manifest during web surfing or even casual content creation work. That said, skin tones were too saturated for professional use. Indeed, comparative testing revealed that the Samsung just couldn't produce the wide range of tones that are intrinsic to high-res, high-color-depth digital images. We saw accurate tones on the Sharp LCD, and we see them everyday on CRTs. But we didn't see them on the Sammy. As for the hidden reflection in our high-detail TIFF, the panel failed miserably and the inadequate onscreen control menu couldn't help matters any. Only gamma correction via our videocard's control panel could bail it out.

Times New Roman was difficult to read below 9-point. That didn't surprise us, but we were given a series of rude jolts by the touch-sensitive onscreen control panel. It was *too* touch-sensitive, and its incessant beeping made us want to call F.A. Porsche to ask him if he'd ever design a 911 cockpit that barked at you every time you adjusted your seating position.

OK, enough bellyaching. The 171P's chassis looks great. It will class up any businessman's mahogany desk, and its picture quality isn't all that bad for a Sunday driver's jaunt on the Internet. But this isn't the LCD for a serious hardware enthusiast who values pixel quality over cosmetics.

VERDICT: 6

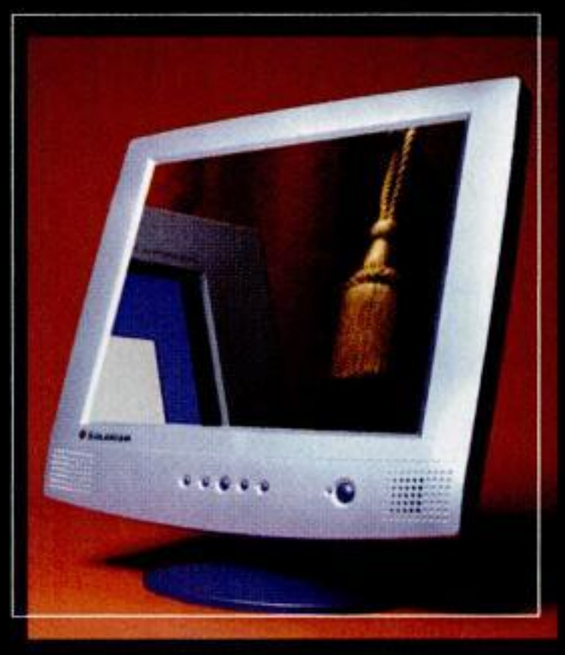
www.samsungusa.com, $900

Samsung: Nice industrial design, but the pixels in the 171P don't produce the prettiest picture.

Solarism LM1711

For some inexplicable reason, Solarism flat-panels have garnered a reputation for being especially appropriate for gaming. We couldn't tell you why, though we have noted that the company's products have been reviewed ad nauseaum by gaming-related web sites—so maybe it's a case of honor by association. Regardless, we can tell you that the 17-inch LM1711 is the brightest damn LCD we've ever tested.

The display's backlight is advertised to shine at 600 candelas per square meter. All the other panels in this roundup top out at 200-to-250 cd/M2, so you can believe us when



Solarism: The LM1711's paint job was rough around the edges, giving the panel a rather home-made feel.

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Hitachi: The CML181's chassis is as bland as bland can be. Even the carbon-copy ViewSonic had more-pleasing design lines.

we state that the Solarism is borderline lethal when turned up full-blast. The company says the extra brightness improves the panel's color range, but we couldn't find any evidence of this during testing. However, we did note that on different occasions the LM1711 emitted a noticeable hum that increased in intensity during brightness adjustment—and the only way to eliminate the hum entirely was by setting brightness to the absolute max.

Adjusting brightness levels couldn't fix a terrible perimeter darkening problem (perhaps the panel's industrial-strength backlight has something to do with the flaw). We also found a bad grayscaling anomaly: In the 256-level grayscale ramp, there was an obvious, nonlinear jump in gray value every 16 bands. High-res images were surprisingly well-rendered, all things considered. And in fact, the Solarism is the only panel in the roundup besides the Sharp to offer gamma adjustment (albeit very limited at just three settings: dark gamma, off, and light gamma). That said, by toggling from off to light gamma, we were able to switch the hidden reflection in our test TIFF from invisible to plainly visible, so a shout goes out to Solarism for this small success. Text was poo-poo below 9-point Times New Roman.

We appreciate the composite and S-video inputs, but find the screen inconsistency, grayscale ramping, and brightness-level hum extremely troubling. There's no reason to buy this panel unless you're going blind—or have perfect eyesight and *want* to go blind.

VERDICT: 6

www.solarism.com, $925

Hitachi CML181

If this month's roundup were a beauty pageant, the Hitachi's oatmeal-beige chassis would win a special award for Most Homely Contestant. But, alas, it's inner beauty that counts most, and the old CML181—god love the old girl—has got it going on.

Though the 18-inch panel exhibited a rather significant screen consistency problem (the perimeter of the display was noticeably dark), it also demonstrated wonderful grayscaling abilities, which transferred into good skin-tone reproduction during our high-res image viewing test. Tonal gradations were all present and accounted for, though the image itself was still over-saturated. Unfortunately, this couldn't be addressed with onscreen controls (or at least the controls that are made available when the display is running on its DVI input). As for the grayscaling itself, the Hitachi was able to resolve nearly all the light-gray bands on the 128-band grayscale ramp. But just like every other monitor in the roundup except the Sharp, Iiyama, and Solarism, the Hitachi was unable to display the full hidden reflection in our high-detail TIFF unless aided by video-card-based gamma correction.

Text reproduction fell apart below 9-point—this, despite the deployment of some type of patented technology that's supposed to enhance text. The CML181 comes with built-in speakers (don't even *think* of using them), and a headphone jack (a nice convenience). The panel also features zoom and pan controls: First you magnify your screen image, then you pan the exploded view so that the content you most care about is centered. Sounds nice, but the zoom feature's interpolation algorithm will give you a case of the soft-focus blurries.

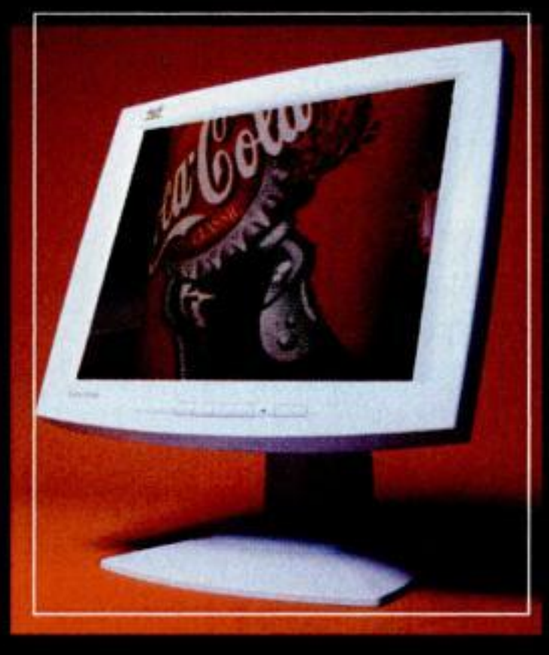
All in all, we wouldn't be embarrassed to have the Hitachi on our desks. It just wouldn't be our first, second, or even third choice.

VERDICT: 7

www.hitachidisplays.com, $900

ViewSonic VG181

It's no secret that ViewSonic makes neither the tubes for its CRT monitors nor the LCD substrates for its LCD monitors. Instead, the company buys core hardware from other companies, adds its own circuitry and plastic chassis, then brands the resulting products with the ever-familiar Gouldian finches logo. This is the business model followed by every other western company that markets LCD panels, as well as a good many Asian companies (only a small handful of far-eastern manufacturers make all of the world's LCD substrates).



ViewSonic: The body design might be conservative, but the VG181 also comes in black.

We're telling you this only because during testing, the 18-inch VG181 looked uncannily similar to the Hitachi panel reviewed above: Both exhibited nearly identical performance during *DisplayMate* testing (notable darkening around the screen perimeter, carbon-copy grayscaling), both have the exact same zoom and pan controls (the only two displays in the roundup to offer them), and both have the numbers 181 in their name.

Rather curious coinkydinks, don't you think?

Like the Hitachi, the ViewSonic rendered our high-res image with good skin-tone gradations but saturated colors, and it couldn't resolve the hidden reflection in our high-detail TIFF. However, unlike the Hitachi, the ViewSonic's chassis is also available in black, and can pivot to run in portrait mode. We don't have any empirical proof that the VG181 is just a CML181 in ViewSonic clothing, but we do know for a fact that the VG181 uses Hitachi-manufactured components. But, hey, it's not a capital crime to rebrand another company's core hardware. We recommend that if you walk into a store and see the VG181 and CML181 sitting side by side, you get the one that costs less. They're *that* similar.

VERDICT: 7

www.viewsonic.com, $900

Sharp LL-T1820

This 18-inch Sharp doesn't look like anything special—but don't let the ugly-duckling act fool you. Underneath the mousy exterior are two new technologies that can measurably improve image quality: 10-bit gamma correction and Zero Voltage Black. We're talking real-deal R&D success here, folks.

10-bit gamma correction increases the number of colors the monitor is able to resolve, and this in turn can produce much finer color gradations in photographic images. Here's how it works: Each red, green, and blue subpixel in an LCD pixel matrix is charged with a particular gamma value—that is, a grayscale

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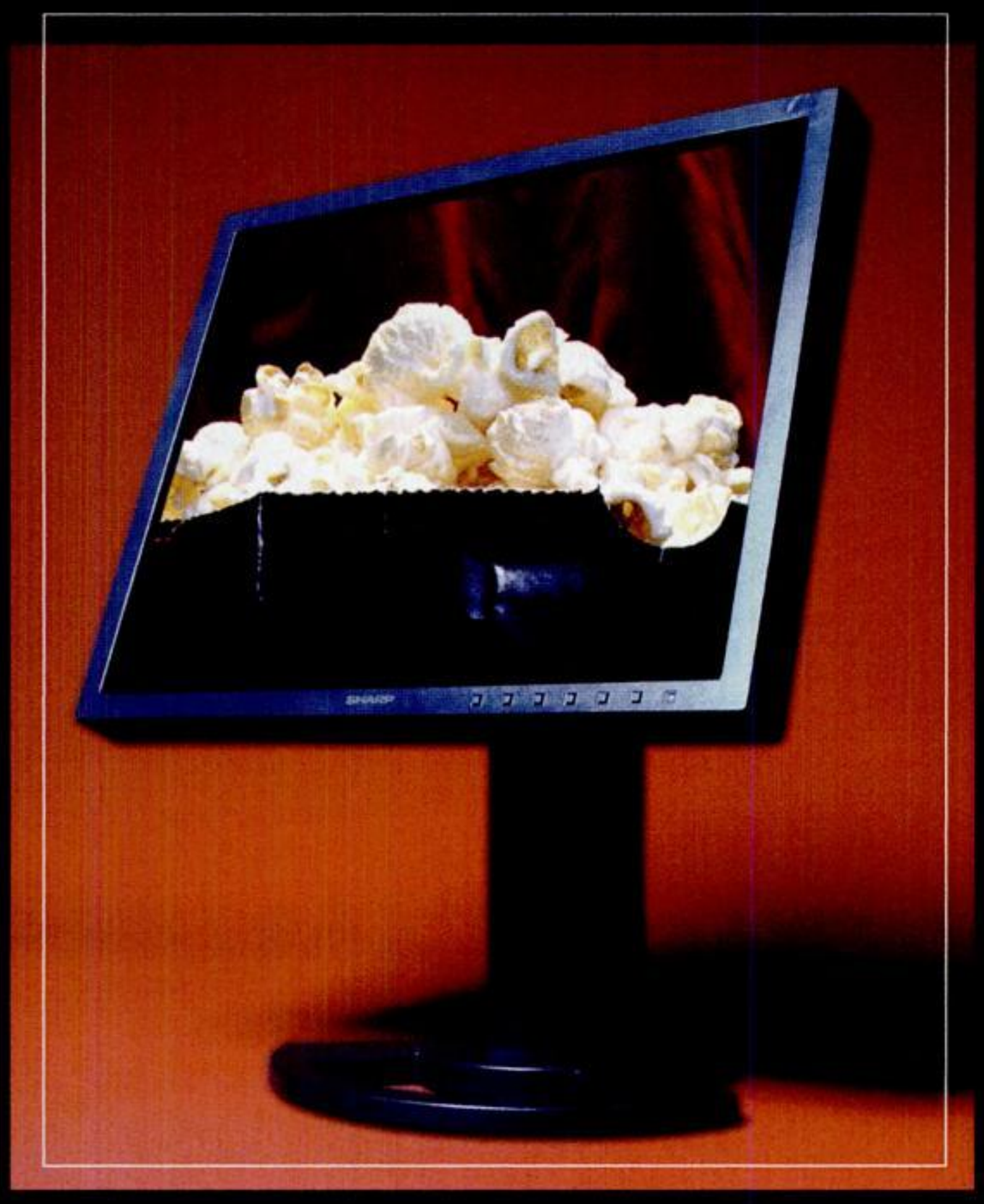

Sharp: The LL-T1820 has a fully adjustable pedestal that can meet your personal needs. Now the panel just needs a hipper overall design.

value that defines the subpixel's relative lightness or darkness. For example, if you jimmy the gamma values of all your red subpixels, you'll get a wide range of reddish color tones—not just a bunch of pure reds, but also light reds, dark reds, and reds that border on black. Throw blue and green subpixels into the mix, and adjust each subpixel's gamma accordingly, and suddenly your monitor's color-rendering abilities are nearly infinite.

Traditional 8-bit gamma correction allows for 256 graytones per pixel, but Sharp's new 10-bit gamma correction allows for 1,024 graytones per pixel—and those extra color tones can make a difference when viewing high-detail pics. For example, our high-res test image of tech editor Will Smith is replete with difficult-to-resolve continuous skin tones, but the Sharp rendered all of them with the acuity of a high-end CRT. Where competing LCDs displayed dark blotches of what looked like eczema, the Sharp rendered normal rosy cheeks. And not only did the Sharp nail all of the image's subtle tonal gradations, it also did so with less blatant over-saturation than any other LCD in the roundup.

Strangely, at its default control settings, the Sharp panel couldn't display the hidden reflection in the very image that the Sharp press-relations team supplied for comparative testing! At first, we thought this was a bit embarrassing for Sharp because the Iiyama panel displayed the detail, albeit it with a terrible pallor. However, after tweaking the Sharp's extensive gamma, color, white balance, and saturation controls, the reflection came out, and in noticeably richer colors than what was ultimately achieved by the Iiyama. Gamma adjustment is native to some high-end CRTs, but Sharp is the first company to bring a serious gamma slider (it offers 20 different settings) to LCDs.

It must be noted that with all the other displays in this roundup, we could evoke the hidden reflection in the TIFF by adjusting our videocard's gamma setting in Windows—*the Sharp LCD was just the only monitor that could nail the gamma correction by itself.* Indeed, Sharp's 10-bit gamma correction is a wonderful fine-tuning feature that can either complement or replace the gamma correction already provided by many videocards. And, of course, by tweaking the two gamma control sets with utmost precision, you should be able to achieve near-perfect visual balance. Just make sure you understand the Sharp's control set in order to get the most out of it.

So does the Sharp actually display more colors? Well, it's often very difficult to determine with mere human eyes. But dig this: With all the other monitors in the roundup, we saw no noticeable effect when we dropped our videocard settings from 32-bit to 16-bit color. But with the Sharp, dropping down to 16-bit had a noticeable degrading effect on the color quality of our high-detail images. This is proof positive that the Sharp squeezes every drop of color from high-detail images, while competing LCDs don't always render everything an image has to offer.

Our other favorite R&D advancement is what Sharp has dubbed Zero Voltage Black, an engineering trick that practically renders the annoying broken pixel effect obsolete. To understand how it works, you need to know how flat-panels operate: When you apply voltage to a subpixel in a traditional LCD display, the molecules in the subpixel's liquid crystal material line up with the field produced by the voltage. This alignment effectively turns off the pixel; any light emanating from the panel's backlight is blocked. Conversely, when voltage is removed, light can pass through. The subpixel is like a window shade that opens and closes as voltage is switched off and on.

Now, if you have a *broken* subpixel, applying voltage has no effect on the alignment of the liquid crystal material—light permanently shines through. The result is a persistent fleck of beaming bright light that mars an otherwise normal screen image (and, of course, most LCD displays ship with a few broken pixels; it's a manufacturing inevitability).

Enter Sharp's new technology. Zero Voltage Black reverses the voltage model. The application of voltage opens the subpixel's window shade, while the absence of voltage closes the window shade. The upshot is that broken subpixels on Sharp's new displays are relatively unobtrusive. Because they don't beam glaring backlight, they appear as subtle, muted flecks that blend in with the pixels of whatever's being rendered onscreen. During Lab testing, we searched far and wide for broken subpixels on our review unit, but found nothing. It's possible the unit was devoid of pixel flaws, but it's also possible we just couldn't perceive a few hidden duds. During an earlier product demo with a different LL-T1820, we couldn't find any broken pixels until a Sharp representative pointed one out. Hopefully, future evaluations in our Reader Reviews section will shed more light on Zero Voltage Black.

Screen uniformity was marvelous, and Times New Roman text rendering fell off below 9-point. During *DisplayMate* grayscale testing, the Sharp was always at the head of the pack in its default mode, but required adjustment on our part to *lead* the pack. This demonstrated once again that while the display looks wonderful out of the box, it's also a sensitive instrument that requires fine-tuning for specific tasks. Many people may not need this level of precision.

It would be easy to knock the LL-T1820 because it's not a 20-incher, but that would be missing the point. Its technology is truly bleeding-edge, and it will surely find its way into larger Sharp displays. This is it, people: Pixel for pixel, the most precision-engineered LCD flat-panel we've ever tested. Nice price too.

VERDICT: 10

www.sharp-business.com, $1,300

Iiyama: We like the BT's stark industrial design; we don't like the panel's actual screen quality.

Iiyama AS4637UT BT

Upon firing up the ridiculously named AS4637UT BT, we saw a washed-out screen that lacked contrast and couldn't render a 100 percent black if its life depended on it. *DisplayMate* testing backed up this bad first impression. None of the Iiyama's grayscale screens displayed

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anything close to pure black, and side-by-side testing with other panels just nailed this point home further. What's more, in the 256-band intensity ramp, we saw bad compression at the dark end of the white-to-black gradation. At the point where the screen should have been 95 percent gray, it looked just 70 percent gray—then it abruptly shifted to about 90 percent gray and held pat, never reaching the inky, midnight, "damn that's black" black that we saw rendered by other panels.

But then we threw real-world images on the 18-inch Iiyama, and suddenly the grayscaling flaws made sense. High-detail pics still lacked brilliance, but at its default settings, the Iiyama was easily able to resolve the hidden reflection of the photographer in our Sharp-supplied test TIFF! Onscreen control tweaks couldn't help the Iiyama approach the vivid color reproduction of what was eventually accomplished by the Sharp, but the reflection was visible nonetheless.

So what we have here is a strange mix of virtue and dishonor: a washed-out screen that can resolve a lot of detail. It's clear that Iiyama wanted to strike a unique compromise with its default gamma settings, and in the process robbed Peter to pay Paul. The Iiyama performed without a hiccup during other tests, and comes with all the fanciest input options plus four USB ports. But we still can't heartily recommend it, considering there are so many superior alternatives.

VERDICT: 7

www.iiyama.com, $1,200

EIZO FlexScan L685

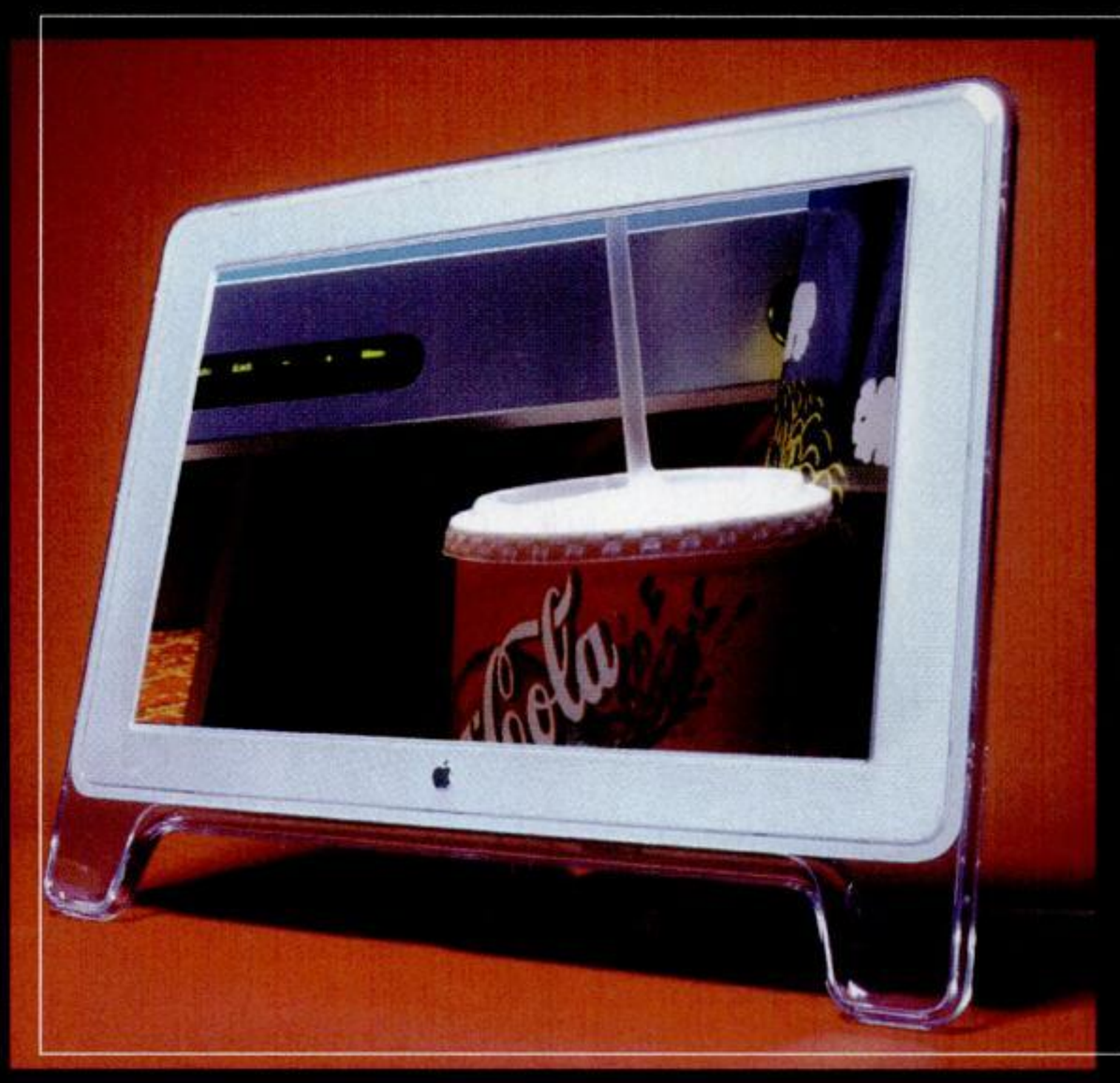
At $1,600, the EIZO L685 doesn't offer an extra $300 worth of picture quality compared to the $1,300 Sharp. But the 18-inch L685 is still a very good display, and its special IT administration support might be more than enough reason for some people to throw down.

Screen consistency was impeccable. In fact, the EIZO's desktop was so devoid of perimeter darkening, it made decent panels from 1999 and 2000 look like utter crap in comparison. Grayscaling was also marvelous: The EIZO couldn't beat the Sharp in the 128-band grayscale ramp, but it did demonstrate better (well, actually perfect) ability in resolving extremely dark gray blocks against a pure black background. Skin-tones looked fantastic; a bit more saturated than the output of the Sharp, but all subtle tonal gradations were present and accounted for. Unfortunately, like most of the panels in this roundup, the EIZO couldn't resolve the hidden detail in our helmet photo, even after tweaking onscreen control (and, of course, gamma and saturation controls weren't present).

But for most of the images a regular PC user would ever view, we doubt anyone could argue that the Sharp offers "better" visual quality. The Sharp is simply more true than the EIZO; more CRT-like. And when you're not concerned with perfectly accurate color reproduction, a slightly saturated screen image like the EIZO's can be pleasing. Unfortunately, the EIZO's text rendering fell apart below 9-point, so if you're not a committed imaging professional, it might make sense to go with BenQ's panel—its visual quality isn't quite as exacting, but it offers better overall text reproduction and more screen real estate (albeit for a higher price).

With USB ports, dual DVI inputs, an integrated power converter, a fully adjustable pedestal, and portrait mode support, the L685 is full of little touches designed for user convenience. Of course, the less-expensive Sharp panel offers all these features and saves you $300. But what the Sharp doesn't have is compatibility with EIZO's *Screen Administrator* software, which among other things, lets corporate IT bosses inventory systems, turn off monitors, and even broadcast instant messages across a whole fleet of EIZO displays.

EIZO: The L685's picture quality exceeds its chassis' basic aesthetics.



Apple: Who says a cool-looking chassis must be either silver or black? The HD Display is an entrancing example of industrial art.

Maximum PC isn't interested in such corporate mumbo-jumbo, but the admin support does help explain the L685's lofty price tag.

We like this panel. If it offers just the features you're looking for, or you just can't find the Sharp, buy it and never look back.

VERDICT: 8

www.eizo.com, $1,600

Apple Cinema HD Display

We're not fans of small, waif-like displays. No, we like our LCDs to be skinny in the middle, but fat in the caboose. So when we connected the 23-inch, 1920x1200 HD Display to our test PC, we knew we had found something special. The HD Display provides a breathtaking amount of screen real estate that just seems to go on and on forever.

Apple points out that its panel is intended for cohabitation with Mac hardware, and when it's running on a Windows PC via an adapter, you can't fine-tune your screen image. Indeed: There are no front-panel controls; all adjustments must be done within MacOS. Nonetheless, we're happy to report that when running the HD Display on our test PC via Dr. Bott's DVIator, the monitor looked just as awesome as it did when connected to a Mac at default settings. (The DVIator is an adapter that connects the HD Display's ADC cable to a PC videocard's DVI interface.)

We cannot overemphasize the luxury that 247 square inches of screen real estate provides—and pixel by pixel, image quality was superb. We noticed slight perimeter darkening, but were impressed by the relatively small amount, considering how much territory the backlight needs to illuminate. The panel achieved a perfect, linear grayscale gradient in *DisplayMate's* 256-level intensity test, but exhibited a slight inability to resolve the lightest and darkest grays against pure white and pure black (at least at the PC's default settings). For office work and even prosumer-level content creation, the HD Display's pixel quality will more than satisfy PC users. That said, at its default settings, skin-tone reproduction was markedly saturated, and the panel couldn't resolve the hidden reflection in our high-detail TIFF.

And this is where the HD Display becomes a less attractive solution for Windows people. When hooked to our test PC, we couldn't access gamma correction in our videocard's control panel; it just wasn't available. No, to get any type of gamma correction with this monitor, you'll need to fiddle with the Apple Display Calibration menu—which means you'll need to run the panel on a Mac.

The HD Display is stunning. Just be aware that if you hook it up to your PC, you're stuck with the default screen properties, which are great but not perfect.

VERDICT: 9

www.apple.com, $3,500

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Dare to Compare: Specs at a Glance

	Screen size/ resolution	Pixel pitch	Power supply	Inputs	Extras	Price/ verdict
NEC 1880SX	18/1280x1024	0.280mm	Integrated	DVI (2), analog	Portrait mode	$1,300/9
Planar PV174	17.4/1280x1024	0.270mm	Power brick	DVI, analog	Portrait mode, USB (2), speakers	$750/6
BenQ FP2081	20/1600x1200	0.255mm	Power brick	DVI, analog, composite & S-video	Picture-in-Picture	$2,000/9 plus Kick Ass Award
Samsung 171P	17/1280x1024	0.264mm	Power brick	DVI, analog	Portrait mode	$900/6
Solarism LM1711	17/1280x1024	0.264mm	Power brick	DVI, analog, composite & S-video	Speakers	$925/6
Hitachi CML181	18/1280x1024	0.280mm	Power brick	DVI, analog	Speakers, headphone jack	$900/7
Viewsonic VG181	18/1280x1024	0.280mm	Power brick	DVI, analog	Portrait mode	$900/7
Sharp LL-T1820	18/1280x1024	0.280mm	Integrated	DVI (2)	Portrait mode, USB (2)	$1,300/10 plus Kick Ass Award
Iiyama AS4637	18/1280x1024	0.280mm	Integrated	DVI (2), composite & S-video	Portrait mode, USB (4)	$1,200/7
EIZO L685	18/1280x1024	0.280mm	Integrated	zDVD (2)	Portrait mode, USB (4)	$1,600/8
Apple HD Display	23/1920x1200	0.258mm	Power brick	ADC	Cool on/off button	$3,500/9

And Our Award for Best Picture Goes to . . .

Obviously, the Sharp LL-T1820 wins this year's Best Picture award. Other panels might look very, very good at first glance, but only the Sharp offers a level of fine-tuning equal to what you'll find in the best CRTs. Plus, it renders truer colors and truer skin tones with the least saturation. Until we can find a better LCD, the Sharp will stay in our Lab and serve as a benchmark against which other panels will be tested. As for our other awards ...

BEST COSTUME DESIGN

In a surprise upset, the Porsche-designed Samsung beats the Apple Cinema HD Display. Both panels are fabulously attired, but the Samsung appears just a bit more manly—you can almost picture it smoking a pipe, and reading the sports page. Plus, the Samsung has a sturdy handle for convenient transport. Too bad the 171P's visual quality isn't equal to what we've seen in other Samsung LCDs.

BEST BREAKTHROUGH PERFORMANCE

Until three months ago, we had never even heard of BenQ, but as soon as we plugged in the FP2081, we knew that we would be following the company's products for quite a while. For the record, BenQ use to be a member of the Acer manufacturing family, and is now an arm of AU Optronics, one of the largest LCD manufacturers in the world. BenQ's 20-incher displayed remarkable image quality, and when push comes to shove, we actually prefer it over the Cinema HD Display. Both panels offer larger expanses of grazing land than a spaghetti western, but the Apple panel is hobbled by its lack of PC support. This isn't Apple's fault, but PC owners must take note.

BEST TEEN FLICK

Hey, today's kids have relatively low expectations. Just give them decent lowbrow entertainment at an affordable price, and they'll be happy as post-pubescent clams. The Planar PV174 doesn't offer anything close to high-end visual quality or controls, but it comes in a garish chassis that the kids just love and gets the job done at a very reasonable price. For basic dorm room web surfing, there's no reason to spend $1,300 on the Sharp when you can have the spunky Planar for $750.

THE MIA FARROW AWARD FOR MOST

Call the Fashion Police! This Diva Needs a Makeover

MOUSY APPEARANCE

Flat-panels are slick, sleak, cool, and modern. They belong to the realm of science fiction. They're the monitors of the future! So why in the world would anyone buy a boring, staid-looking LCD display? Sorry, Hitachi, but you have to gussy up your panels in order to impress the casting directors during open calls. Your performance was fine, but you just don't have the "look" for the part. ■

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OUT of

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the SHADOWS

No one thought 3Dlabs was up for the fight, but now the perennial also-ran is preparing a surprise Ninja attack on the videocard competition. Technology maven Neil Trevett reveals the revolutionary new P10 graphics processor, and explains why Toy Story graphics—let alone A-title shader games—aren't yet available on the PC.

Six months ago, if you had told us that 3Dlabs would be assimilated by Creative Labs, and the unified company would take on nVidia and ATI in the consumer videocard market, we would have told you to switch to a less toxic brand of crack. But this fantasy scenario is quickly becoming reality, and the 3D landscape has never been more exciting. Toss Matrox into the mix, and you have a four-way brawl. It's like 1997 all over again!

When the deal goes through, 3Dlabs will become a wholly owned subsidiary of Creative Technology (the parent company of Creative Labs). The companies' new P10 graphics processor will be marketed as a workstation chip under the 3Dlabs name, while Creative Labs will use its sumo-like marketing muscle to push the same core technology in consumer-level videocards intended for gamers.

Why? Why *now*? After all, 3Dlabs has always been known for its workstation cards—the company's gaming cards have traditionally been outclassed by faster silicon. The answer can be summed up in one word: programmability. The next generation of chips from 3Dlabs, nVidia, and ATI will offer a level of programmability that

PROFILE

NEIL TREVETT

And he would be...?

Senior Vice President of Market Development, 3Dlabs. But he's not just a marketing weenie. He's been with 3Dlabs for almost 20 years, and he can discuss silicon-level architecture with the best of them.

And we would care because...?

3Dlabs released the first 3D accelerator for the PC in the form of the Creative 3D Blaster—way back in 1996. It beat nVidia's NV1 by about a week. Now 3Dlabs is aiming to trump the competition once again.

P10

Silicon: 76 million transistors on a 0.15-micron process
Memory: Up to 256MB of 256-bit DDR SDRAM
Core clock: Unknown
Memory bandwidth: Up to 20.8 GB/sec
Interface: AGP 4x
Release date: Sometime before 2003

Ninja Uniform Supplied by TIGERSTRIKE (www.tigerstrike.com)

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makes the shader units in current top-notch videocards look like hard-wired kiddie toys. What we have here is a looming 3D revolution—a revolution that's leveling the playing field, allowing 3Dlabs to slip back in.

Does the P10 chip have the fighting skills to leapfrog over nVidia and ATI? That remains to be seen. We know that the two graphics powerhouses are sharpening their swords, and it's very unlikely they'll be caught completely off-guard. But 3Dlabs is indeed the first of the three companies to release its new architectural details, and what's been announced is a chip with an almost CPU-like amount of programming flexibility.

Unlike current 3D chips, which offer only meager programmability for the manipulation of vertices and no programmability for the manipulation of pixels, the P10 will offer immense programming freedom for every portion of the 3D rendering pipeline. Indeed, the P10 is rife with CPU-like execution units that game developers can put to use in any way they see fit.

The upshot is that games will look more amazing than ever, and developers will be able to code them quicker than before. But you'll need to read further to find out the whys and hows. To get the inside scoop on the revolutionary technology behind the P10, we sat down with Neil Trevett, a senior vice president at 3Dlabs. Watch your head, because he's throwing strikes.

MPC: When we pitched ideas for this photo shoot, you immediately jumped on the ninja motif. Is there any particular reason?

NT: I think 3Dlabs is doing a ninja attack on the consumer graphics market. No one was expecting it, and we've been doing it in full stealth mode. We've jumped out of the background, and I think we're going to surprise a few people. And we've armed ourselves with some pretty neat weapons.

MPC: We haven't heard a whole lot from 3Dlabs lately. What's the top-secret chip that you've been working on?

NT: 3Dlabs has gone quiet for the gaming player because we've focused solely on workstation graphics for the last few years. For gaming, you're right—we haven't been an active player for a while. But we've had 100 engineers working on our new VPU [*visual processing unit; 3Dlabs' own buzzword -ed*] for close to three years now, so it's a huge investment. We're going to be using it in the workstation space. But the other big news is we've been recently acquired by Creative Labs. So Creative is going to be taking this technology and adapting it for the gaming market.

MPC: How did the two Labs hook up?

NT: I think it was a mutual realization of opportunity. One of the good things about the acquisition is that it's not some company that we've never dealt with before. We've been working closely with Creative Labs for 10 years now. I don't know if you remember, but the first 3D chip ever to appear on the PC was the Creative Labs 3D Blaster, which was a technology licensed from 3Dlabs. We beat the [nVidia] NV1 by three and a half weeks.

So, throughout the last 10 years, we've been working closely with Creative. They have been a shareholder in us, and they've used other vendors as well, of course, but we've always kept that good relationship going. We basically found ourselves with a good relationship and a realization that we had good technology and they had a good market opportunity, and, hey, why not work together.

MPC: Tell us about silicon specifics.

NT: The P10 has 76 million transistors. That's actually 13 million transistors more than the GeForce4, but we think we get good value out of those extra 13 million transistors. In essence, the chip packs over 200 32-bit processors onto a single chip. So in its highest-performing form, it's 200 gigaflops of processing power and over a tera-op of integer.

MPC: So what *really* makes the P10 different from the competitions' products?

NT: Programmability. Programmability is the key and I think programmability is going to be the biggest revolution in the PC graphics industry. It's going to be as big a revolution as when we first got the traditional APIs—Direct 3D and OpenGL 1.0. For the gaming community, it's going to mean a big step closer to interactive visual reality. For the game developers, it's going to mean that suddenly they are freed from a limited palette of creativity, and they're going to find their horizons of creativity just opening up in front of them.

MPC: What makes the P10s pixel and vertex shaders different from the competition?

NT: If you look at the P10 visual processing architecture, at the high level, our key differentiator is that we have the first architecture to be programmable from top to bottom. The other guys start out programmable at the top of the pipeline, and gradually become less and less programmable as they go down. So there are three main programmable stages where we need the flexibility of programmability. One is the geometry part of the pipeline. The other one is the texture part of the pipeline. And finally, the back-end pixel part of the pipeline.

MPC: Walk us through the pipeline, and describe how you're programmable not only in the geometry stage, but also in the latter stages.

NT: Typically, in the geometry part of the pipeline, you're doing the transformations and lighting on vertices. We're beginning to do more interesting things in that stage, like displacement mapping. But I think this new programmable architecture will even go much further than that.

The next stage down is the texture stage. Now,

Our key differentiator is that we have the first architecture out programmable at the top of the pipeline, and gradually

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this is where the [current] GPUs begin to lose their programmability. They have the flexibility in that they can get lots of textures and munch them together in very interesting ways. You can get some wonderful effects that way, but it's not programmable in the sense that you can take a ray-tracing engine or a *RenderMan*-class, photo-realistic shader, and compile and run it on a register combiner. Current GPUs simply aren't programmable in that sense.

With the SIMD array that we have, we have 128 processors in our texture stage. And we use all of that processing power in a totally general-purpose way. So we're a superset of GPUs. VPUs are a superset of GPUs. So, we can do anything a GPU can do. We can emulate register combines, no problem. But we can also go beyond that flexibility into true programmability, enabling people to do ray-tracing renderers, volumetric renderers. Really, whatever developers can program, they can now begin to accelerate in the graphics hardware.

And finally, in the pixel processing stage, the GPU guys don't have any programmability, not even flexibility. They're hard-wired. Their antialiasing, for example, is hard-wired in the GPU. In the VPU architecture, even this back-end pixel stage is truly programmable. Yet another SIMD array [handles the pixel processing]. And that gives you a huge amount of flexibility.

MPC: Is the P10 fully DirectX 9 compliant?
NT: Not quite. I think none of today's existing hardware is fully DX 9 compliant. There are different layers of DX 9 compatibility, and it will be interesting to see how the marketing wars work out. We can definitely ship DX 9 drivers; that's no problem. But the interesting areas of debate are the Vertex Shader 2.0 and Pixel Shader 2.0 specs. They're the two interesting things for the gaming community and are a part of the DX 9 spec. P10 can support Vertex Shader 2.0, but P10 will not be able to support Pixel Shader 2.0 because we don't have the floating-point power that we would need to fully support it.

MPC: So the P10's pixel engine is integer?
NT: It's a mix of integer and floating point. So I think it's going to take the next generation of silicon, and we need to tick down one or two processes before anyone is going to be able to build a fully DX 9–compatible chip.

MPC: What do you lose by having integer calculations in the pixel pipeline instead of floating-point calculations?
NT: Well, it means that the developers have to be a little more careful. If they start doing really complex algorithms and multi-pass algorithms on pixels, you can begin to lose some accuracy. Now, the 3D programmer can get around it, but it's just a hell of a lot easier to do it in floating-point and not worry about accuracy or anything.

Going towards floating-point pixel processing is definitely the right thing to do. It's just a matter of how many gates you can cram on a chip. We already have 76 million transistors!

MPC: So if the P10 is so damn programmable, what differentiates it from a CPU?
NT: Parallelism. The key difference—and the reason why graphics processors will always deliver more graphics bang for the buck than CPUs—is that the poor-old CPUs have to cope with optimizing scalar C code, which is totally general-purpose. Now they try hard to extract parallelism, and they're doing well if they get a 1.5x speed-up via parallelism. In graphics, there's an embarrassment of parallelism, both at the vertex level and the pixel level—we're drowning in parallelism! That means we can implement these highly parallel architectures, and quite easily so, to do effective parallel processing. So we will always deliver more bang for the buck than the general-purpose CPU. In some cases, we see up to a 200x speed-up.

MPC: What can a developer do with your fully programmable shader engine that he can't do with the engines on current boards?
NT: In the gaming space, I think one of the first applications in practice will be procedural textures where you achieve really sophisticated texturing effects with no bitmaps at all. So that solves the download problem.

Another interesting thing we've got running in OpenGL is a very realistic fire shader. We don't need to have bandwidth-breaking bitmapped animations. You can just write a little program, download it, run it on the VPU, and up pops fire!

MPC: And you can do the same thing for volumetric textures?
NT: Yeah, basically. It's going to take a few years for the developers to really wrap their minds around what they can do. Although the revolution might take longer than you expect, it will have a bigger effect at the end. It won't happen overnight, but I think you will soon see stuff appear, then grow, and then you'll gradually see more and more.

We were at E3 exposing these concepts to the developers and were getting extremely positive feedback. And over and over again, we heard the message, "Oh my God, we have this problem with the flexibility, but not the programmability, of DirectX 8." The problem is that everyone's game is beginning to look the same. The game developers are finding it more and more difficult to differentiate themselves because they have this limited palate that's basically what DirectX says you can do—how you can combine textures together—and that's it. With general-purpose programmability, we will have unleashed the creativity of all these different games developers, and you'll get totally different genres of visual effects.

MPC: What's the story with the P10's virtual memory subsystem?
NT: The virtual memory subsystem is an evolution of the virtual texturing subsystem that we've had in our workstation boards for a few years. But it's the first time that we have general-purpose virtual memory implemented in the graphics device.

MPC: So this works kind of like an L2 cache on a CPU?
NT: Exactly. What happens is the onboard memory on the graphics board ceases to be a finite resource that has to be managed by the poor old developer when it's doomed to run out anyway. So it essentially becomes large L2 cache [of all the memory in the system].

MPC: What are some real-world examples of how the virtual memory will benefit an end-user?
NT: First of all, it'll let developers use much larger data sets than has really been possible to manage before. You'll get much more realistic textures and much deeper and more realistic–looking scenes, because you've effectively broken the limitations of onboard graphics memory.

So if we're successful in getting this out there, when you run games on a virtual memory chip—like the P10—you'll probably get more textures, more details in your scenes. And we've made good progress in making it well-exposed to the developers. Microsoft put the hooks in for virtual memory in DirectX 9, so that's really a key step in making this virtual memory technology a mainstream technology. One day, every graphics chip is going to be built like this.

MPC: Can you provide more specific examples?
NT: An excellent example is in the flight simulator. Because the flight simulation community is striving for ever-greater realism, an airplane model will typically have very large textures. So the problem is if you're flying along, and you have a MIG-29 that comes at you from just over the horizon. A normal graphics card will say, "Oh, the MIG-29 model is needed. I have to download all the textures and all the mipmap levels." That can be a multi-megabyte download. So when that plane pops into view—even though it's only a couple pixels on the screen—the application has to shuttle down megabytes of textures. And if the plane turns around and scoots away, then that's a wast-

to be programmable from top to bottom. The other guys start become less and less programmable as they go down.

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ed amount of download.

With virtual texturing, you only have to download the mipmap levels as they're needed—actually, as they're used by the processor. So as the plane gradually gets closer, the chip will automatically be bringing down the textures, and as you spread out the texture download, you don't get any big jerks in your gameplay. Even better, if the MIG-29 turns around and goes away again, then the bigger mipmap levels are never downloaded.

MPC: Lots of gamers aren't seeing any hard benefit to having any type of programmable card right now. What is 3Dlabs doing to explain why they need to get a programmable shader card?

NT: There are a couple of things that are really holding back the number of DirectX 8 titles actually hitting the street, even a year and a half after DirectX 8 was initially launched.

First of all, because DirectX 8 sets the programmability at the assembler level, this keeps developers from quickly deploying the programmable titles. It's more difficult to program at the assembler level than it is at the high-level language level. And because of the way that DirectX evolved, there are two assembler level APIs—one for ATI and one for nVidia. So the poor developers have to learn the code and difficulties of not one low-level API, but two! That has proven to be difficult. It's twice as much work, and it's a lot of work to begin with.

The key thing is to make games programmable using a high-level language, a hardware-independent language. And this is yet another lesson we can learn from the CPUs. And the magic word is the compiler. *[A compiler translates code written in a high-level programming language such as C into a language native to a specific piece of hardware, such as a VPU. –ed]*

MPC: Why are compilers so important?

NT: There's this underlying theme that there's lots of stuff we can learn from CPUs; we don't have to reinvent all these wheels. And once you have a compiler in the chain, you can provide a very C-like shading language to the developers. That makes it 10 times easier for them to develop good titles. And, also, because the graphics vendors themselves will be providing the compiler back-ends, it will alleviate the pain developers have to go through to port their code onto each individual graphics chip. That should be largely hidden by compilers that are written well.

MPC: Will the compilers be able to write clean code that won't have errors? Or is that something the developer will have to pay attention to on the API level?

NT: No, I think the compilers should [know the limitations of the chip]. Today, graphics vendors live or die by the quality of their drivers, while tomorrow, the graphics vendors are going to live or die by the quality of their compilers.

MPC: That's a frightening thought!

NT: Yeah! But it's good news for the developers because, again, all the headaches in coping with different hardware back-ends, and all the idiosyncrasies of the individual chips, will be a thing of the past once we have compilers in the chain. The graphics hardware vendors will assume the responsibility for hiding the idiosyncrasies of their hardware by supplying a compatible compiler back-end. This is going to make the lives of games developers an order of magnitude easier.

MPC: How are hardware vendors reacting?

NT: We're beginning to get widespread hardware support. I mean, this is *not* a 3Dlabs specific thing.

In the next few years, we will have architectures that are you could literally take the Yoda model and run it interactively

You're never wasting memory bandwidth. The memory access is always completely optimized.

MPC: What about in a 2D application? Will virtual memory make your desktop faster?

NT: Yes, it'll definitely make your desktop faster, particularly as we go to the new generation of Windows. Longhorn [the code-name for Microsoft's proposed 3D operating system] proposes a really intractable problem when you think about it.

If you have a high-resolution screen that's double-buffered and Z-buffered, you can absorb 64 megabytes of graphics memory even before you're running any applications. And then you have a full-screen application—that's another 64MB. And then another and another and another, all overlaying each other to create this highly complex, dynamic media environment on your desktop. There's no way that's all going to fit. The only way to make that run in practice is to page the obscure graphics resources out of the graphics board back onto the host. This virtual memory subsystem is really the only way to do it. Virtual memory is the only way to do it, and the only way to do it is in hardware. The graphics community is about to discover that same thing.

You can also use virtual memory for applications like *Photoshop*. You can bring in huge images, and not have to worry about nasty memory management problems.

MPC: How does anti-aliasing work on the P10?

NT: Using the programmability, we can support fully hardware-accelerated accumulation buffering at 64-bits. That's a cool effect, and I can't wait for the game developers to use it because, as you know, with accumulation buffering, you can get depth-of-field effects and things like motion blurs.

Of course, we have super-sampling, but for gaming there is multi-sampling, which is the best trade-off of performance and quality. We have multi-sampling up to eight-way, while the GeForce currently is only doing four-way multi-sampling. The really neat thing is that because the back-end pixel processor is programmable, if a developer doesn't like any of our out-of-the-box anti-aliasing techniques, he can program his own. We're doing it in the full glare of open publicity. We generated white papers on our web site. We have the compiler source for our initial prototype compilers. They're available under an Open Source license, too, on our web site. So we're doing everything we can.

MPC: Creating the Yoda model in *Attack of the Clones* was one guy's job for an entire year. Obviously, PC game development companies don't have the budgets to throw that kind of manpower at developing content.

NT: The Yoda model uses algorithms that are far beyond the algorithms that are implemented in the current GPUs. If you want to get somewhere close to that, you'd end up really reducing the complexity of the model and reducing the complexity of the rendering algorithms, and you'd end up with a kind of facsimile. But you wouldn't end up with the real thing.

What we're working towards is enabling the real thing eventually. I'm not saying that the P10 will get there tomorrow, but in the next few years, we will have architectures that are fast enough and flexible enough that you could literally take the Yoda model and run it interactively on your desktop—if Lucas would let you. I think we'll get there within three years.

MPC: So you're saying that it's not a problem with the rendering architectures now. Rather, it's more a problem with just the speed of the architectures?

NT: It's a problem with the current GPU architectures. They simply don't have the programmability and the flexibility to even start to port that complex an algorithm. I don't know for certain, but I would imagine that with the Yoda example, there are megabytes of source. You're never going to write that in assembler; you'll use a C-like language that you need to compile. The only platform with the flexibility to do that today is the CPU.

That's why ILM has a farm of hundreds of Sun workstations. That's what we're trying to achieve in the visual processing architecture. We're stepping toward the programmability that would allow us to take really complex algorithms and accelerate them in realtime in hardware.

So that's one part of the problem—architectur-

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al flexibility. Then there's going to be the performance. Yes, even 200x might not be fast enough to do Yoda in realtime, but within the next few years we are going to get there.

MPC: 3Dlabs is heavily involved in contributing to the next OpenGL spec. What does OpenGL 2.0 give to gamers?
NT: The OpenGL people have been looking enviously over the fence to DirectX for a while now because DirectX has programmability and OpenGL hasn't, unless you use some vendor-specific extensions.

MPC: Are we going to see "OpenGL vs. DirectX Wars: 2.0"?
NT: No. The religious war 1.0 was highly counterproductive and destructive. A lot of people were spending effort knocking the other guy, rather than figuring out how to help the developers code better applications faster. The API war 2.0 is actually not going to be a war at all—it's going to be "enlightenment 2.0." Working at the high level, we can bring these two disparate fields much closer together. We might not get to the idea of having one high-level API immediately, but with the right cooperation, we can set the two camps on a convergence path.

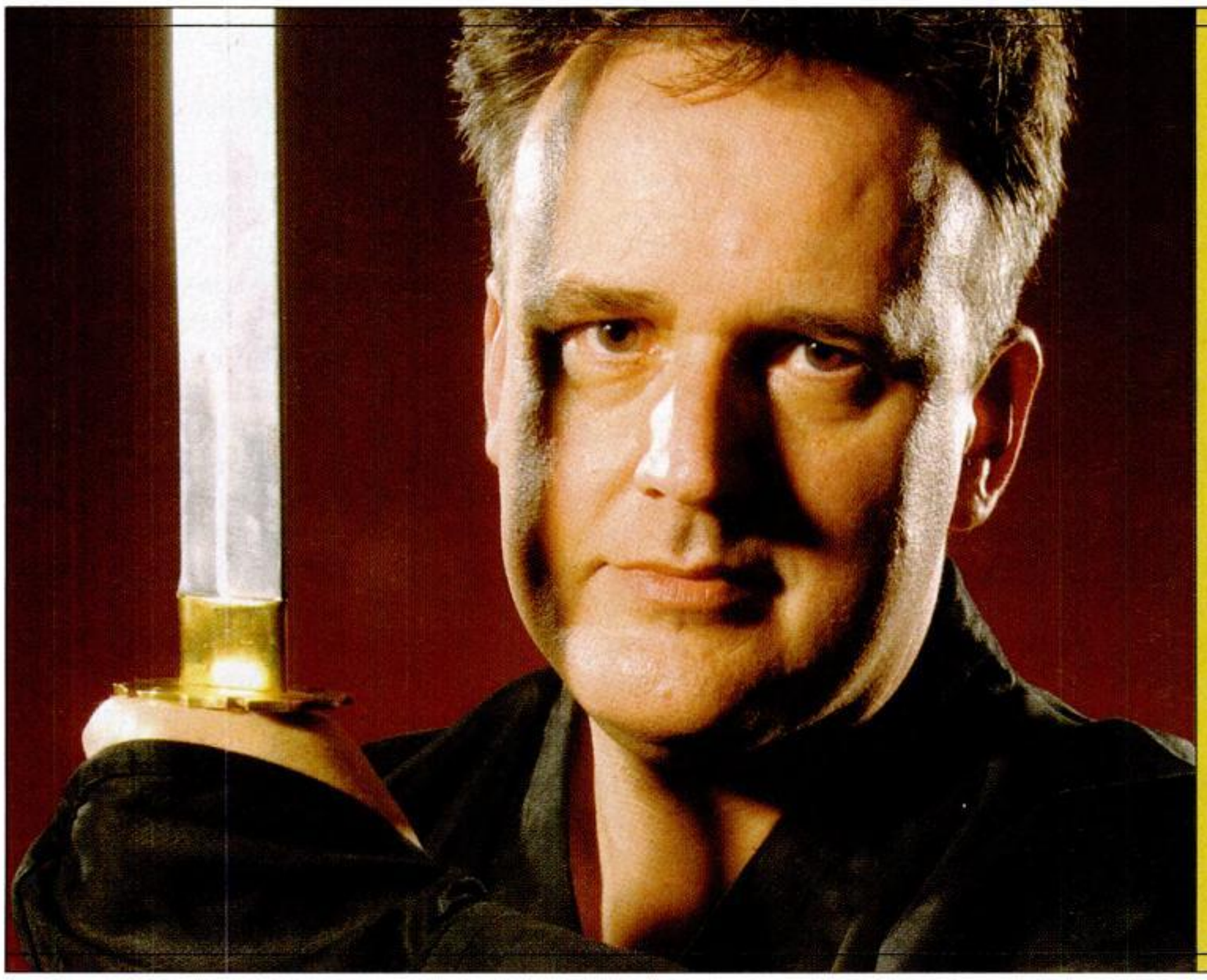
MPC: So is this high-level API going to be a part of OpenGL 2.0 and also adopted by DirectX?
NT: Well, I can't speak for Microsoft, but....

MPC: If 3Dlabs had its way...?
NT: If we had our way—OK, well, we are having our [pauses]—We are one of the key drivers in the definition of OpenGL 2.0, which is being done in the [OpenGL Architecture Review Board], so everyone is contributing. But it is true that we are the main driving force behind it right now. What we're defining in OpenGL 2 is an approach that has been heavily asked for and endorsed by the developer community. It's a high-level shading language that's very C-like, so they don't have to learn a new language.

MPC: What's your favorite game?
NT: I'm a *Medal of Honor* addict. Before that, I played *Half Life*. I guess I'm a first-person shooter guy. *Medal of Honor* is interesting. If you look at it from a graphics vendor perspective, I think they've done a good job in really increasing the immersiveness of the visual environment.

There you have it: the future of 3D graphics according to 3Dlabs. In coming months, we'll actually review the P10 to see if it has sufficient firepower. After all, Trevett's comments sound good on paper, but his chip will still need to perform. We'll also extend interview invitations to nVidia and ATI to let them discuss what makes their own 3D architectures so damn special. ■

fast enough and flexible enough that on your desktop—if Lucas would let you.



THE COMPETITION COUNTER-ATTACKS

We asked our contacts at nVidia and ATI to give us a single question they'd most like to toss at Neil Trevett. Here they are, along with Trevett's responses.

nVidia: Can you reprogram the P10 to fully support, and be hardware-compliant with, the new versions of DirectX or OpenGL when they come out?
NT: In general, yes. We have the programmability to provide natively accelerated support for a huge range of API functionality. There are some API features that are simply going beyond the bounds of today's silicon. The most tangible example is the Pixel Shader 2.0 spec in DirectX 9. We could provide floating-point support before pixel operations in the software using the programmability, just like you can run a DX 9 Pixel Shader 2.0 program on a CPU. But it probably wouldn't be usably fast. But the answer is yes.

I think the question is a good one, actually, because it shows nVidia's mindset. They have a very hardware-oriented mindset that thinks, "If it's not running natively in hardware, it can't be real graphics." We're coming from a more software-oriented mindset that's saying really, "A sufficiently powerful programmable processor can provide native very high performance support for any API feature you wish."

ATI: It has been stated that your pixel shader programmable architecture is general-purpose. Without referring to any particular DirectX API specification, wouldn't it be more difficult for programmers to develop applications specific to your architecture rather than adhering to a particular DirectX pixel shader spec? If this is not the case, then what DirectX pixel shader version do you support, and how is your implementation any more programmable than another that supports the same version?
NT: That's actually a good question, too. The question is asking, Will we be trying to persuade developers to use some non-DirectX proprietary interface, so they can get access to our programmability? The answer is no. We are real strong believers in standard graphics APIs, and we would as a matter of policy never ask a graphics programmer to use a proprietary API or interface of any sort.

So what interfaces are available? There's DirectX, and we support the current DirectX, which is DirectX 8.1. We can support a lot of DirectX 9, with the exception of Pixel Shader 2.0. We have OpenGL 2.0, which is an open standard. That's not the proprietary API for 3Dlabs. Yes, it has been driven by 3Dlabs. We are working hard to make it applicable and attractive to the entire industry.

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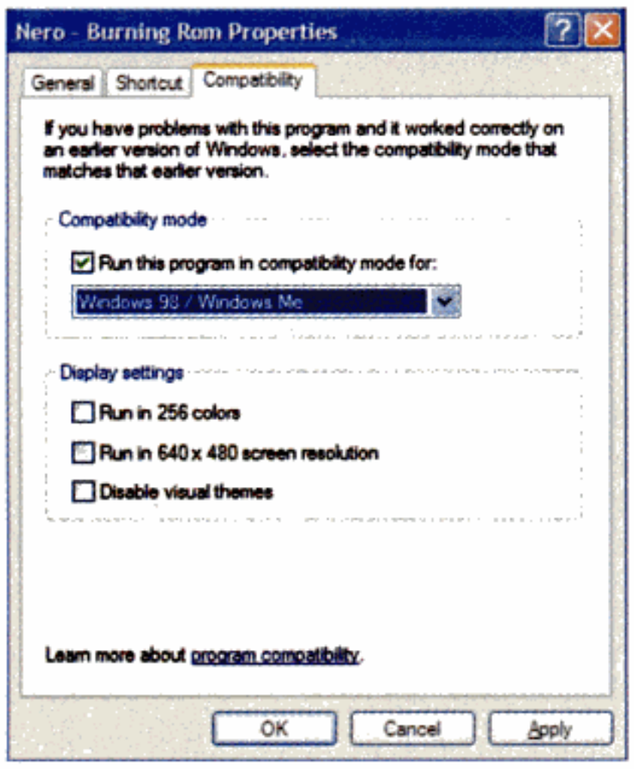
Ask the Doctor

Symptom → Diagnosis → Cure

Have a burning PC problem? How about a burning PC sensation? We're more than happy to help you with your PC problems, but you might want to get that sensation thing checked out by a qualified sensation checker-outer. If you have PC questions, send them to **doctor@maximumpc.com**. Just remember: We can't answer every e-mail. Oh, no—not by a long shot.


Nero - Burning Rom Properties
General
Shortcut
Compatibility
If you have problems with this program and it worked correctly on an earlier version of Windows, select the compatibility mode that matches that earlier version.
Compatibility mode
Run this program in compatibility mode for:
Windows 98 / Windows Me
Display settings
Run in 256 colors
Run in 640 x 480 screen resolution
Disable visual themes
Learn more about program compatibility.
OK
Cancel
Apply

By using WinXP's built-in Compatibility mode, you can sometimes get recalcitrant applications to run.

WinXP Doesn't Like My Software

I have upgraded my OS to WinXP Pro. I love it, but I have a few games and other programs—some old and some brand new—that just won't run with XP. Can you help?

—DANNY

Getting legacy apps to run in XP can be tricky. The best place to start is with the compatibility wizard. Right click the shortcut for your app, go to Properties, then click the Compatibility tab. We've found that most apps run with either Win98 Compatibility mode or Windows 2000 Compatibility mode, especially if you select the "Disable Visual Themes" option.

If you run into an app that won't run in one of WinXP's Compatibility modes, then you might want to try dual-booting your PC with Win98 or another OS that you know works with the app. When installing a dual-boot system, make sure to install the oldest OS first, then the more recent. For example, if you want to install Win98 and WinXP, install 98 first, then once that install is complete, put XP on another partition.

If you're playing intense 3D accelerated games, such as first-person shooters, then a videocard upgrade could help you more than a CPU upgrade.

Which Videocard Is Right for My PC?

I know a lot of people ask which videocard they should buy. My dilemma relates to which card, given my particular computer processor and speed.

I have a custom made P-III 933MHz, 384MB PC100 SDRAM, ASUS CUV4X motherboard, and a 32MB GeForce2 GTS card. I'm ready and willing to spring for a GeForce3 Ti card or maybe a GeForce 4, but wonder if my processor and RAM could effectively use the extra videocard boost. Would I be better off plunking down the bucks for a Pentium 4 1.8GHz machine instead?

—ROBB SEYLER

Well, Robb, you pose an interesting question. Whether a videocard upgrade or a CPU upgrade will help more depends on the types of games you play. If you're playing intense 3D accelerated games, such as first-person shooters, then a videocard upgrade could help you more than a CPU upgrade. On the other hand, if you're playing non-3D accelerated games, like many realtime strategy games and some RPGs, a CPU upgrade will provide greater benefits.

The other thing to consider is price. Upgrading your CPU isn't as simple as buying a Pentium 4 and plugging it into your current motherboard. You'll need to purchase a new motherboard for around $100, probably new RAM (another $100 or more, depending on the amount you buy) and a new power supply ($50 or so). Upgrading the videocard is as simple as pulling the old one out, and putting the new one in.

Getting Rid of That Pesky Floppy Drive

I just recently built my newest system and decided I didn't need a floppy drive. So I assembled the machine, went into the BIOS, disabled everything that even mentions floppy, loaded Win98SE, and bang...it works...*not*! If I go to My Computer it shows a "Removable Drive A," and if I go to the Performance tab on the System Properties window it shows the message: "Drive A is using MS-DOS compatibility mode (yadda yadda)...." Can you please tell me what on earth I have to do to convince Win98 that there is no floppy drive?

—SHANE WEAVER

After conducting exhaustive digging through our archives and harassing sources around the web, the only thing we know to do is upgrade your OS to Windows 2000 or Windows XP. (The Microsoft Knowledge Base article about this very issue says, "To work around this problem, you can safely ignore it.")

We've tested floppiless configs with both Windows 2000 and Windows XP and not had any of the weird problems that you describe with your Windows 98 config.

MSConfig Just Ain't in Windows 2000

I have a friend who is having problems with his machine. He has a ton of programs running on startup and it takes forever to load. He's running an Athlon 700 with Windows 2000 Pro with Service Pack 2. Neither of us can find the msconfig.exe for cleaning out the System Tray. Is this something not included in Windows 2000? If not, is there another way of keeping all these programs from starting on bootup?

—TYRONE HERNANDEZ

Unfortunately, Microsoft didn't include msconfig in Windows 2000. The good news is that we can help you find which programs are starting up with Windows.

The first place to look is the Startup folder in your Start Menu. Any programs in there will be run every time Windows is started. Delete the shortcuts you don't need.

Next, go to the Start Menu, click Run, and type regedit, then press enter. Browse down to HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Run and look at the keys in that folder. Each one starts an application that runs every time Windows starts. There are a few programs you should probably keep. We'd recommend against removing anything that resides in the c:/winnt or c:/windows directory or any of their subdirectories. As a general rule, any shortcuts that run toward RUNDLL32.EXE should remain installed as well. All the other shortcuts are fair game.

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MP3 Hiccups

I've been having trouble playing my MP3s. The first time I play an MP3 file, there is some kind of interruption at the beginning of the song, then it continues to play. I have to push stop and play the song again for the MP3 to play without a problem. I have the latest versions of *MusicMatch Jukebox* and *Windows Media Player*, and this happens with both. I have played many different MP3s and even re-downloaded some songs, but it still happens. I updated sound drivers, defragged, and scanned my drive for errors, all to no avail. I experience the problem using both my HP Pavilion laptop with a 550MHz Celeron and my Compaq Presario laptop with a 533MHz AMD K6 and 96MB of RAM. So do you think you can help me?

—O.A. ASSAD

You've done some pretty good triage already. You tried downloading new MP3s and had the same problem—check. You tried different media players, but that didn't help either—check. You even tried a different laptop with the same result. Well, there's your biggest clue.

The real problem here—and you might want to sit down for this one—appears to be that both of your laptops are just too slow. In fact, some of the specs you listed are the *minimum* requirements for running both of the media players you mentioned, and we all know that minimum requirements do not yield the best results. And remember, MP3s aren't played "as is"—they have to be decompressed just like a zip file. Most rigs today don't have any problem doing this on the fly, but an older processor running a new, resource-hogging media player while simultaneously running antivirus and indexing software in the background... well, you get the idea.

Just to make sure, try playing one of your MP3s on a friends faster desktop system. We bet you'll find that it plays without a hitch.

All is not lost, though. You might still be able to coax one or both of your laptops to play MP3s without hiccups. First, try to find the lightest, simplest software MP3 player. With less than a 10MB memory footprint, *Sonique* (www.sonique.com) is a likely contender. Next, have a look at your System Tray. Are there apps you can temporarily disable, like antivirus software or *IM* clients? Disable them. You might even want to stop apps like these from loading automatically at startup. Go to Start > Run > and type `msconfig`. Click on the Startup tab. Uncheck anything you don't want to automatically launch (they can always be re-checked later).

Keep trimming the fat off your OS in this manner until your MP3s play without skips. Or just go back to vinyl.

The Image Thing

Can you recommend a good program to use that will make an image of my hard drive? Sometimes when I install a new program on my computer, it will have a bad install or some kind of error. Then the aborted install will refuse to uninstall. I'd like to be able to go back to my PC's original state.

—VAN JONES

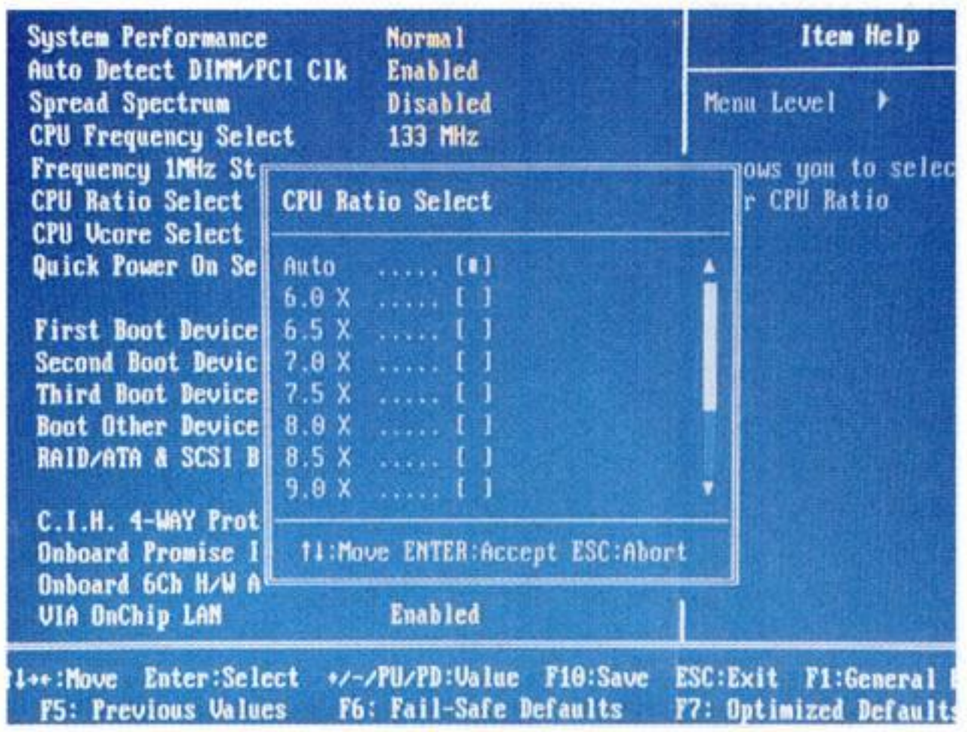
You didn't mention which OS you're using, but if you're using Windows ME or Windows XP, Windows' own System Restore app works well (go to Start > Program Files > Accessories > System Tools > System Restore). It's a surprisingly brawny utility that can rescue you from bad drivers, crashed installations, or just a change of heart about that new shareware you recently adopted.

But System Restore doesn't return the contents of your drive to its original state, nor is it intended to. It still leaves some driver and application files behind, and it won't rescue you from serious file corruption or a virus attack.

A far more versatile approach is PowerQuest's *Drive Image 2002*, a drive imaging utility that the Doctor finds easier to use than *Norton's Ghost*. Complete instructions for using *Drive Image 2002* to make bootable CDs that will restore your PC to its original, pristine state can be found in our "Clean Start" feature on page 24.

Help! Help! My Athlon's Slowing Down!

I bought an AMD Athlon XP 1800+ processor the other day from Fry's Electronics. At first, when I put it in my mobo, it registered as an AMD Athlon XP 1800+ processor. After using it for a while, though, I noticed that when I booted the



Remember, an Athlon 1800XP+ is really just running at 1.53GHz, so make sure your CPU multiplier and bus speed are set correctly.

system was calling it an "AMD Athlon processor, 1150MHz." Can you help me fix this problem? The motherboard I planted it into is an ECS EliteGroup K7S5A. Thanks.

—DAVID VEGA

You most likely have the bus speed incorrectly set on your motherboard. First, you need to know that the Athlon XP 1800+ is really a 1.53GHz CPU. (AMD's goofy nomenclature continues to annoy us.) To achieve 1.53GHz, you need to set a multiplier of 11.5 on a 133MHz bus. If your system is set to 100MHz (for use with a Duron CPU or older 100MHz frontside bus Athlon) you'll end up with 11.5 x 100MHz, or 1150MHz.

System Restore doesn't return the contents of your drive to its original state, nor is it intended to.

Fortunately, your ECS board is equipped with an SiS 735 chipset which supports both 100MHz and 133MHz frontside bus speeds. Look in your BIOS under the CPU's PnP setting. The CPU frequency should be set to 133MHz. If you're running DDR266, the memory should be set to 133MHz. If all this talk about 100MHz and 133MHz bus speeds has you worried you got ripped off, don't fret; the system bus on the Athlon systems are DDR and do in fact support data rates of 200MHz and 266MHz.

So, You Want to HaxOr Your Notebook?

I have a Dell Inspiron 8000, but the motherboard is shot. I was wondering if there is any way to get a replacement motherboard for it.

—SEAN ELGERT

There are very few end-user options for notebook repair. You can either send that baby back to Dell to have the motherboard repaired, or look for a repair shop that can handle the board replacement.

Even though a majority of the world's

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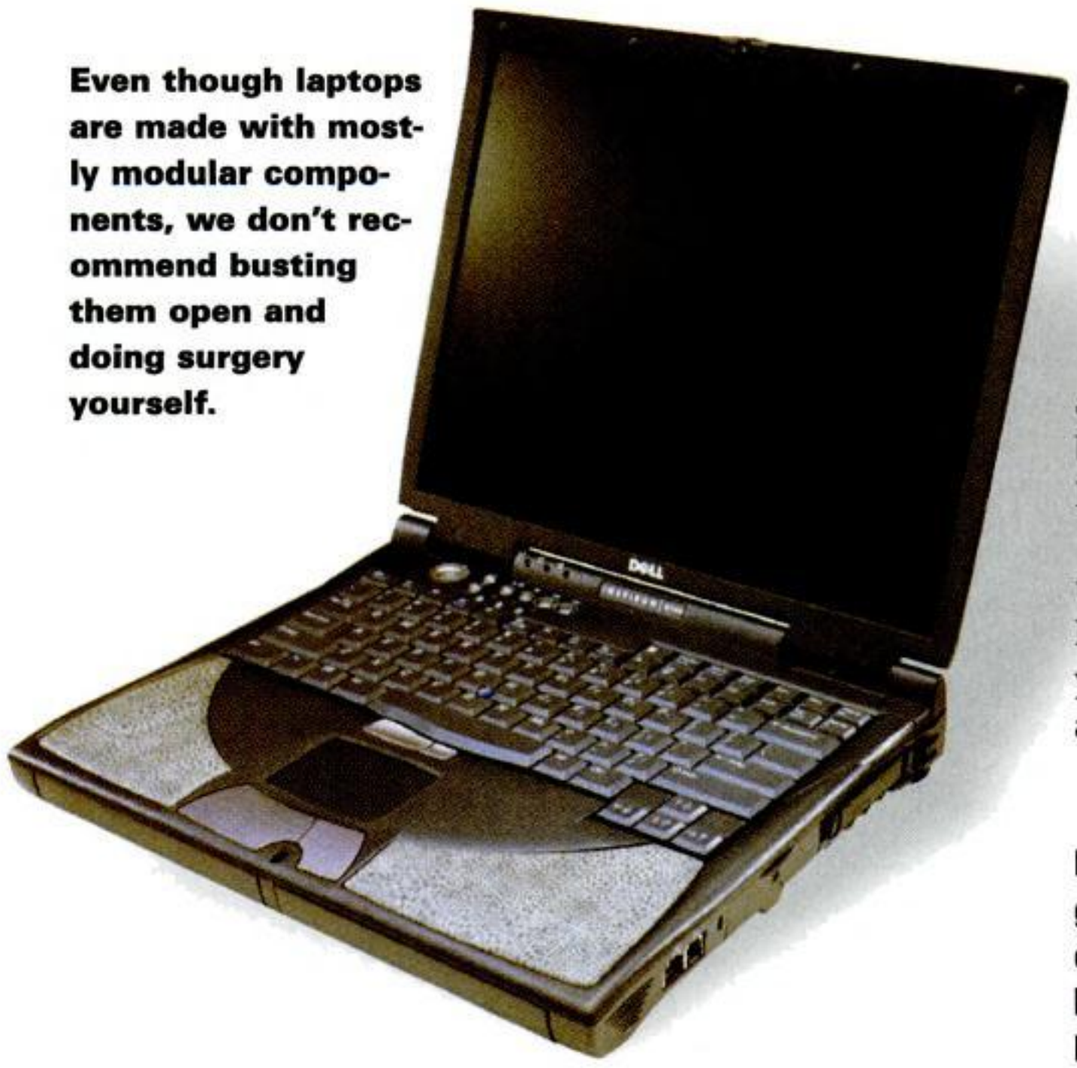
Even though laptops are made with mostly modular components, we don't recommend busting them open and doing surgery yourself.



notebooks are built by a handful of company's in the PacRim, there's still a lot of "magic" in the notebooks of most big OEMs. Many vendors such as IBM or Dell oversee and spec the design and production of the notebooks and perform custom tweaks to the video BIOS and other components. If you want that notebook to live again, your best bet is to go back to Dell.

You should also try isolating the RAM, CPU, and power supply from the testing equation.

Call My PC Sir-Crash-a-Lot

I am having serious problems with a rig I just built. It's an Athlon CPU on an Abit nForce motherboard with a Radeon 8500.I have plenty of cooling and heat dissipation. My problem is that the damn thing crashes when I run any 3D intense applications (such as *3DMark2001* or a 3D game). When not running 3D apps, it also arbitrarily crashes. I have installed all the latest drivers (videocard, mobo BIOS, mobo chipset, soundcard, Windows updates, etc.), none have helped.I have tried disabling or disconnecting everything inside the computer with the exception of the videocard and hard drives. The crashes still persisted. I placed the videocard in a different computer and it ran fine. I put a Geforce2 Ultra in my newly built rig and it crashed. I tried underclocking the CPU with no luck. I receive different error messages ranging from stop errors to page fault errors to IRQ_NOT_LESS_THAN errors to Radeon driver errors to USB port errors, and so on. I sent numerous error reports to Windows Online Crash Analysis. They suggest things that I have already tried or say they will get back to me via e-mail. I have not heard anything from them yet.

I believe the problem lies with the motherboard, but I do not know how to verify this. Any suggestions you may have would be greatly appreciated.

—DARREN WILLIAMS

It sounds like you've done your due diligence in trying to isolate most of the other components. If you're overclocking or you have aggressive memory settings in the BIOS, revert to the default settings. You should also try isolating the RAM, CPU, and power supply from the equation. It's possible that one of the memory modules is defective or the nForce-based motherboard doesn't like the configuration of the memory you've chosen. Among the AMD chipsets, the nForce's 128-bit memory interface is a little finicky about the memory you can feed it. You may want to run the board in 64-bit mode with just one module at a time to see if the crashing goes away.

If it's not the memory, then you also have to consider the slim possibility that the CPU is the culprit. Although extremely rare, it's possible the CPU is defective. If you can borrow a CPU from a friend, try swapping out your CPU for a CPU that you know works. Also borrow a friend's power supply. If it still crashes with the second power supply, then the board is likely at fault. The Doctor's first suspicion is flaky memory, but it's possible the other components are to blame as well.

Before you start your testing, wipe the system clean to make sure it isn't a bad device driver left over from other hardware, and remove all other PCI, USB, and extraneous devices. When swapping components out, swap them one at a time. Good luck.

No Sense Beating a Dead Horse

I bought an Athlon 1000 machine with an 8MB AGP card last March. Since then, it's been returned to the place of purchase multiple times, had a motherboard replacement, and elicited a "CPU is unworkable or has been changed, please re-check CPU soft menu" message. After giving that message, the system shuts down before I can check the BIOS. All I've been able to see is a message that says "fan speed 0." Could it be a defect in the processor that caused this problem?

Earlier this year, I had to return the machine to the shop yet again. At this point the mobo is being replaced for the third time. Do you know of anything that could cause this type of thing to recur?

—CAROL A. EULER

There are quite a few possible problems here.

- **"CPU is unworkable or has changed" is a typical Abit error message to tell you that someone has been mucking around in the BIOS or has a few jumpers flipped that the board doesn't like or doesn't support. To address this, make sure the board is set correctly for your CPU. It should be set for a 100MHz bus.**
- **"Fan speed 0" indicates that either the fan has died and is not spinning or the CPU fan's power lead is not plugged into the correct spot. Make sure it's plugged into the outlet marked "fan 0." To protect the CPU from a dead heatsink fan, some older motherboards will cease working if the fan is not plugged into the correct pins.**
- **You also should consider the immaturity of the Athlon products you're working with: In the 1GHz Athy days, you needed to make sure you were using a power supply with adequate power output (check AMD's web site for an "approved" Athlon power supply). Early Athlon motherboards also had issues with GeForce-level cards that drew the near-maximum power from the AGP port (though, it doesn't sound like you're using a very high–power drain videocard). Finally, the board you have wasn't around for long. VIA's KX133 wasn't fully compatible with the Thunderbird Athlon. You didn't specify whether your CPU is a T-bird or Classic, but you may be one of the people who has problems trying to get the rare slot version of the T-bird working in the KX133 board. Early Athlon motherboards and VIA chipsets certainly weren't known for being as reliable as the competition.**

Because of the potential for problems and the amount of equipment you may have to replace (CPU, Mobo, RAM, power supply), the Doctor recommends that you put the horse out to pasture and buy a gigahertz plus Duron and new mobo (preferably KT333, KT266-A, or nForce based). This shouldn't cost more than $200. ■

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How To...

A step-by-step guide to tweaking your PC Experience

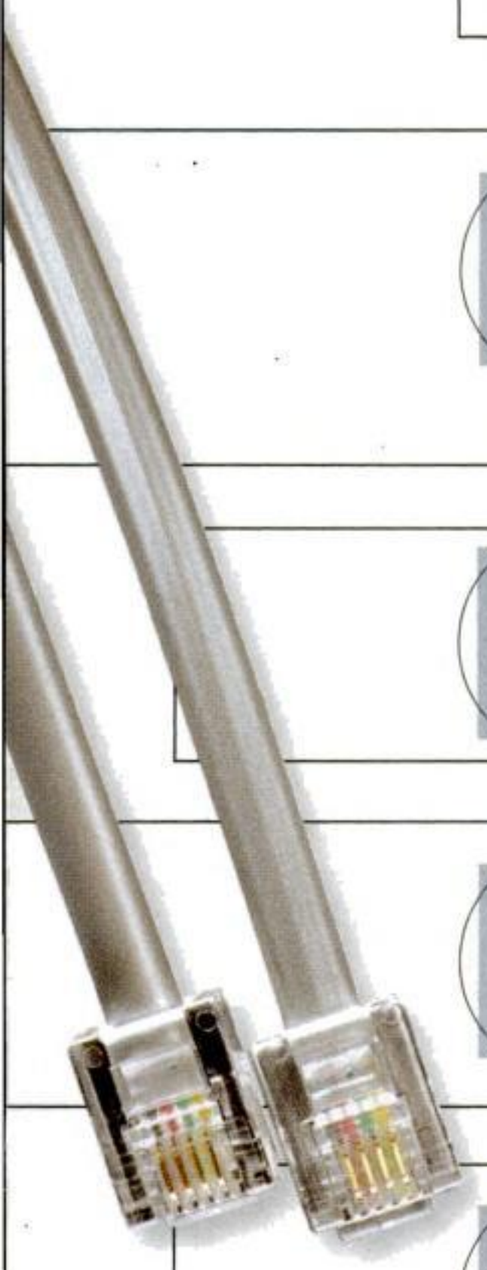
CHOOSE THE BEST HOME NETWORK

In the time it takes you to read this article, you'll know which networking solution is right for you

BY CHRIS "WOLFMAN" LESEMANN

The world is wrought with choices, and sometimes those choices can be overwhelming. One of the most confounding choices we've encountered—ranking right up there with making a coffee selection at Starbucks—is deciding which home networking standard is most suitable for our needs.

There are currently three options available for someone delving into home networking: old-fashioned Ethernet, a phone line–based network, or a wireless connection. Each has pros and cons, and no single option is right for every home. To save you the same humiliation in the home-networking department that we suffer during every trip to Starbucks, we created this handy-dandy flowchart. It's just like a *Choose-Your-Own-Adventure* book, without the pirates.



1 What do you primarily want to use your network for?

(a) Sharing an Internet connection and playing games. Any of the three technologies will work for you.
☞ *Go to question 2*

(b) Transferring very large files between computers. You'll probably want a fast Ethernet solution.
☞ *Go to question 4*

2 What's your budget?

(a) Less than $200. Wi-Fi is out of your price range.
☞ *Go to question 4*

(b) More than $200. All your options remain open.
☞ *Go to question 3*

3 Do you want to be able to use your laptop without any wires tying you down?

(a) Yes. There's only one way to get a wireless connection for your laptop, and it's Wi-Fi.
☞ *Go to question 10*

(b) No. If you're not interested in wireless networking, look into Ethernet.
☞ *Go to question 4*

4 Are all the computers that you want to network in the same room?

(a) Yes. It's easy to run Ethernet between two computers in the same room. So...
☞ *Go to question 6*

(b) No. Wiring an Ethernet LAN between two rooms isn't simple. So let's discuss cabling.
☞ *Go to question 5*

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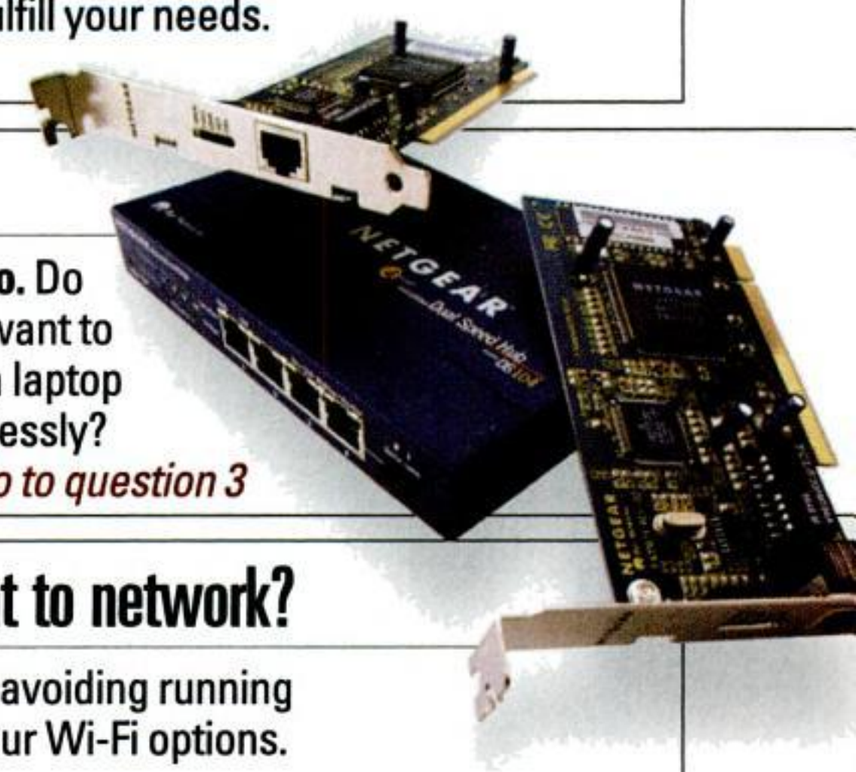
5 Do you want to avoid having to run cables between rooms in your home?

(a) I'm not afraid of cabling. An Ethernet LAN may be just your bag.
☞ *Go to question 6*

(b) I'd prefer not to run cables. Time to check out a simpler option. Maybe HomePNA or Wi-Fi will fulfill your needs.
☞ *Go to question 7*



6 Did you answer question 3 already?

(a) Yes. If you have, an Ethernet kit should fulfill your home networking needs. It should include a hub, a pair of network cards or USB adapters, and enough cable to connect to two PCs. Using that kit and the Internet sharing software built into Windows, you should be able to hook all your PCs to the net.

(b) No. Do you want to use a laptop wirelessly?
☞ *Go to question 3*

7 Is there a phone jack near each of the computers you want to network?

(a) Yes. To use HomePNA without running wires, you'll need a phone jack near each PC you want to network.
☞ *Go to question 8*

(b) No. If you're intent on avoiding running extra wires, check out your Wi-Fi options.
☞ *Go to question 10*

8 Are all those phone jacks connected to the same phone line?

(a) Yes. In order to use HomePNA, all the phone jacks you connect to the PCs have to share a phone number.
☞ *Go to question 9*

(b) No. HomePNA won't work unless the jacks you're using are all attached to the same phone line.
☞ *Go to question 10 for wireless info*

9 Is your phone line clean and noise-free (no buzzing or static while using the phone)?

(a) Yes. A HomePNA phone line network kit should meet your needs. It should include a pair of USB or PCI adapters and enough phone line to connect each PC to a nearby jack . By using this setup and the Internet connection sharing built into Windows, all the PCs in your home will be able to share an Internet connection.

(b) My phones are noisy. A dirty phone line can cause real problems with a HomePNA network.
☞ *Go to question 10 to look into your Wi-Fi options*

10 How far apart are the PCs you want to network?

(a) Less than 150 feet. We've found the effective range of Wi-Fi networks to be 150 feet *at the most.*
☞ *Go to question 11*

(b) More than 150 feet. If you need to connect two PCs that are more than 150 feet apart, your best bet is Ethernet or HomePNA.
☞ *Go to question 4*

11 Do you live in an apartment in a highly developed urban area?

(a) Yes. Cordless phones and microwave ovens can interfere with Wi-Fi networks.
☞ *Go to question 7 to find out about wired options*

(b) No. The 2.4GHz radio frequency that the Wi-Fi uses should be reasonably uncluttered, allowing you to use a Wi-Fi network.
☞ *Go to question 12*

12 Do you just want to connect two PCs to each other, or connect two PCs to the Internet?

(a) Connect two PCs to the net. Grab a Wi-Fi access point with a router, like the Orinoco kit we reviewed in October 2000. It will let you connect your PCs to either a broadband connection or a dial-up account.

(b) Just connect my PCs to each other, please. No need to buy a fancy router, just get a pair of USB Wi-Fi adapters and plug them into your PC. ■

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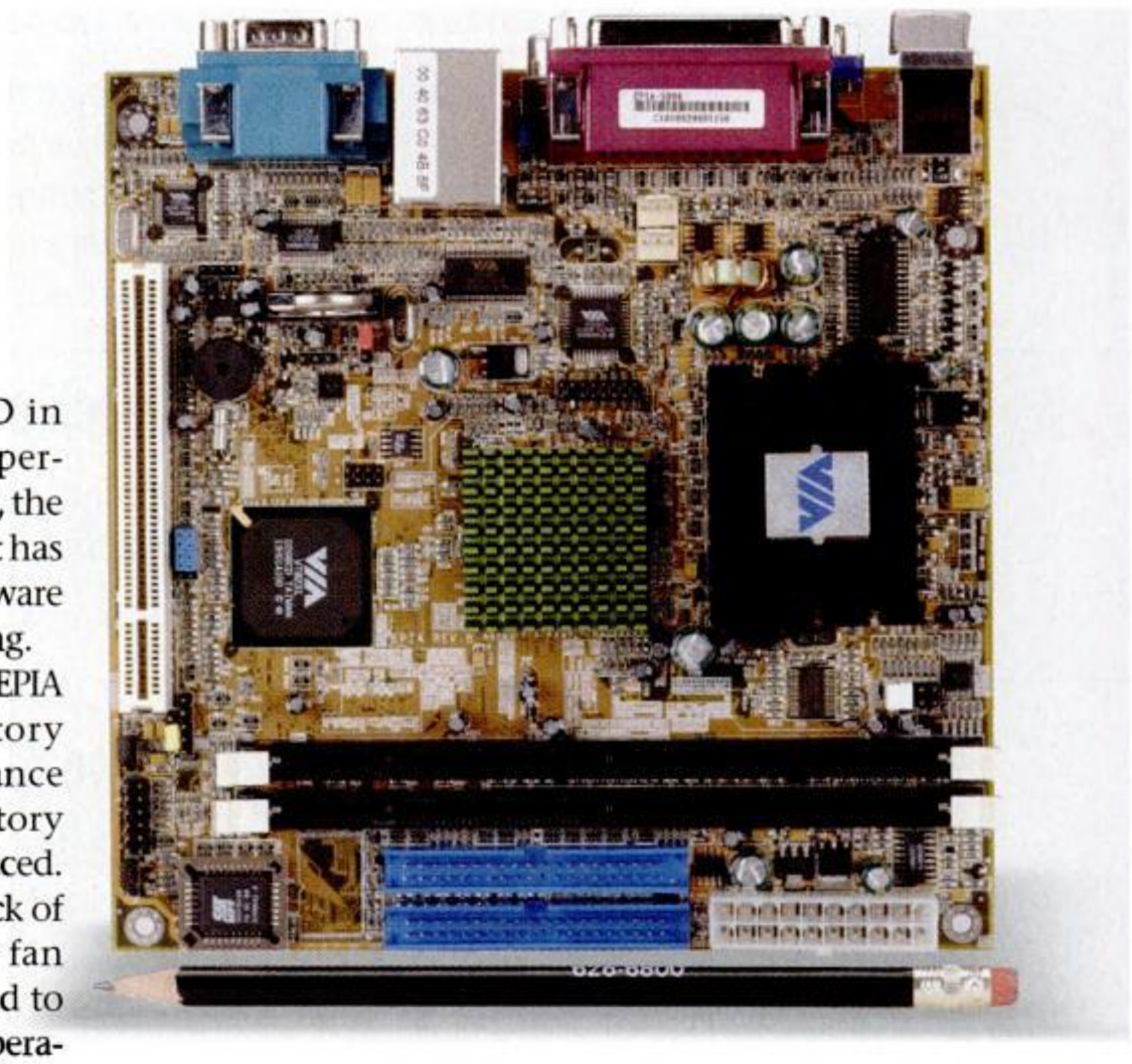
In the Lab

A behind-the-scenes look at Maximum PC testing

Let's Get Smaller

Hands-on with VIA's new Mini-ITX mobo



VIA's new motherboard uses a formfactor that's even smaller than FlexATX.

If motherboards get any smaller, we'll start losing them in the same places where all those teeny-tiny case screws end up. Case in point: VIA's new Mini-ITX formfactor motherboard. It's a full 33 percent smaller than the already minuscule FlexATX design that Intel introduced in 1999. (A FlexATX board is used in the Shuttle SS50 PC, which we reviewed in our June issue.)

VIA sent us an EPIA Mini-ITX motherboard for Lab testing. It was loaded with VIA's own 533MHz Eden ESP CPU and—get this—requires no power-supply fan, which is good news for people obsessed with shushing their PCs. The board is sold by VIA's VPSD division **(www.viavpsd.com)** and features an Apollo PLE133 northbridge, a VT8231 southbridge, integrated 2x AGP graphics, two USB ports, support for 1GB of PC133 SDRAM, Fast Ethernet, and AC-97 audio. It also comes with a pair of ATA100 ports, a single PCI slot, and TV output.

Casetronic's Mini-ITX case uses an external power brick that eliminates the need for a power-supply fan.

The Eden CPU is based on technology from WinChip and Cyrix. In a word, it's slow. Like 1996 slow. During testing with *SiSoft Sandra 2002*, we found the Eden to be comparable to a 300MHz AMD K6-2 in integer performance, and a 266MHz WinChip 2-WD in floating-point performance. In fact, the Eden is so slow, it has trouble with software MPEG-2 decoding.

Of course, the EPIA mobo isn't a story about performance gained—it's a story about noise reduced. But won't the lack of a power-supply fan and CPU fan lead to prohibitive temperatures? Apparently not. During Lab testing, the Eden CPU's heatsink never rose above110 degrees Fahrenheit. To cut interior heat even further, VIA and vendor Casetronic **(www.casetronic.com)** engineered a case with an external power brick, similar to what you get with a notebook. Now, true enough, the Casetronic Mini-ITX-2677 case that we tested does come with a single fan, but we never needed to use it. During testing, the only noise we could hear was the whine of the hard drive. We imagine that if you were running a 5400rpm drive with liquid bearings, you'd probably reduce noise to inaudible levels.

For low-impact workloads such as word processing, web browsing, and e-mail, the EPIA motherboard would be perfect. Shoot, you could even use it to make your own version of Apple's ill-fated Cube. It's a hoot to have a complete machine running without fans in a 6.7x6.7-inch square. And we must add that the board ran Windows XP Professional without a problem.

Mobo Formfactors We Have Known

	Width in inches	Depth in inches
Mini-ITX	6.7	6.7
FlexATX	9.0	7.5
MicroATX	9.6	9.6
Mini-ATX	11.2	8.2
ATX	12	9.6

We got it, we got it, we got it —we don't got it

Well, actually, we *do* have the new Matrox Parhelia videocard. Here you see a final working sample in the hands of John McKinney, a Reader Day 2002 attendee who's now onboard the *Maximum PC* staff as an intern (yes, dreams do come true).

But what we don't have are final Parhelia drivers, so you'll have to wait one more month for an official review. Sorry, folks!

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Maximum PC Verdict-o-Meter

Our product ratings aren't quite as binary as some would think. To help you understand just what a 9, 10, or 2 verdict is worth, we explain the mysteries behind our ratings scale. Keep this chart on hand, because we're only publishing it once this year.

10 The pinnacle of hardware or software excellence. The product demonstrates not only superior performance compared with other products in its class, but also groundbreaking new features or unprecedented attention to detail. Any 10 product is automatically bestowed a Kick Ass Award.

9 An excellent product except for one or two forgivable flaws. Products that receive a 9 verdict may or may not receive a Kick Ass Award—it's up to the editorial board to make that decision. These products are truly among the best of their class.

8 A good effort, but nonetheless a product that exhibits a few flaws or uses slightly outdated technology—an "honest" product that falls below the curve of true excellence. No hardware enthusiast should ever be ashamed to own a product that received an 8.

7 A 7 verdict indicates that you should carefully weigh the costs and benefits of buying the product. These products often come with a frustrating mix of good and bad features.

6 A 6 verdict typically goes to a product that's fourth or fifth best in its category. It more or less works as advertised, but there's no compelling reason to buy it. The product suffers from several serious flaws.

5 A beta product foisted onto the public for debugging. We recommend that you pass until the vendor can prove it has corrected the shortcomings.

4 An insult to your PC. The product might have just a single compelling feature amid a range of embarrassing faults.

3 It sucks. It just plain sucks. But because some person somewhere on this planet may possibly have a use for it, it gets a 3.

2 The kind of product that just plain doesn't work the way it's supposed to. It's so bad, it reaches legendary status for its infamy. It's not the absolute worst a product can be, but it's about 2 nanometers away.

1 A product that's so rank-ass awful, it should be immediately returned for a full refund, then reported to the Better Business Bureau or Public Safety Commission. Not only did it *not* work as advertised, it actually caused harm to you or your PC.

Best of the Best

As of July, 2002

Here are our current top picks for each hardware category. Red text indicates first month on chart. Check back next month for updates.

High-end videocard:
Visiontek Xtasy Ti 4600 (GeForce4 Ti 4600)

Budget videocard:
Leadtek WinFast Titanium 500TD (GeForce3 Ti 500)

Do-everything videocard:
ATI All-in-Wonder Radeon 8500

Soundcard:
Sound Blaster Audigy Platinum

Hard drive:
Western Digital 1200JB

CD-RW drive:
TDK VeloCD-AI-401248

CRT monitor:
Sony F520

LCD monitor:
Sharp LL-T1820

P4 motherboard:
Iwill P4R533-N

Athlon XP motherboard:
Asus A7V333

Consumer DV camera:
Sony DCR-TRV17

Portable MP3 player:
Creative Labs Nomad 3

Photo printer:
Epson Stylus Photo 1280

Palm PDA:
Sony Clie PEG-N760C

Pocket PC PDA:
Compaq iPAQ 3835

5.1 speakers:
Klipsch Promedia 5.1

4.1 speakers:
Logitech Z-560

2.1 speakers:
Klipsch Promedia 2.1

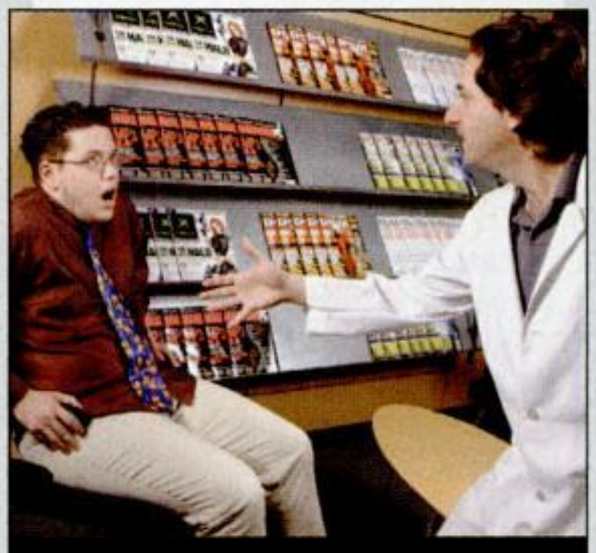
Our current gaming favorites: ***GTA3, Tony Hawk Pro Skater 3, The Elder Scrolls III: Morrowind***

The Adventures of the Lil'est Intern

Last seen, our Lil'est Intern was in a fierce standoff with the office mouse in an attempt to win the heart of Lara Croft. So what ever became of the encounter?

In the heat of battle, Lara's pedestal is jostled, causing the top-heavy beaut to fall upon Lil' Intern—crushing him and all hope of a romantic union.

"Wa...Wa...Wait a minute.... Where am I?"



"Nice to meet ya! I'm Jon Phillips. I understand you're interested in being a *Maximum PC* intern."

It was all just a horrible dream...

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Velocity ProMagix

Mom and Pop come back with a vengeance

When we gave the Velocity Micro a ho-hum 7 verdict in our February issue "Mom and Pop" system roundup, the company didn't piss and moan. Instead, it went back to the parts bin to prove that its computers can run with the best of the big boys. Witness the new Velocity ProMagix—it sports top-of-the-line components and all the performance you'd expect from a top-shelf OEM.

The Velocity rig is based on the Ahanix Platinum XP case. Though it isn't crafted out of any exotic metals, the case does feature a clever bezel system that hides ugly beige optical drives but still lets you access the tray door button. The only downside to the bezel is that it limits your ability to plug headphones into the front of the optical drives. The case also has a front-mounted LCD that apparently displays CPU temperature. We couldn't determine where the data was coming from, and we didn't want to rip apart the machine to look for leads, but the gauge seemed fairly accurate.

Top-notch performance and a wired-tight interior make the ProMagix a winner.

On the inside, the machine builds upon an Asus P4T533-C, the sequel to the popular P4T motherboard. The board uses Intel's 850E chipset, runs a 533MHz system bus, and offers no fewer than six USB ports, four of which are USB 2.0-compliant. Velocity jammed in a 2.5GHz Pentium 4 and 1GB of Corsair PC1066 RDRAM. In the graphics department, you get an MSI GeForce4 Ti 4600 clocked up to 315/343MHz. For storage, there's a Plextor 40x CD-R/RW drive and a Pioneer DVR-104 drive, which is the OEM version of Pioneer's kick-ass AO4 DVD recorder. Velocity also resisted the urge to use a single 8MB cache Western Digital drive. Instead the rig has two 120GB 1200JB drives (16MB of cache!) running in RAID 0 on a Promise FastTrak TX2000 controller.

We don't know whether it's the PC1066 memory, the RAIDed hard drives, or the Asus motherboard's aggressive memory timings. But we can say that the configuration as a whole hammered the competition.

Granted, compared with the Compaq reviewed on page 61, the Velocity lagged in Adobe *Premiere*. This is to be expected, because the Athlon XP owns this benchmark. But in nearly every other test, the Velocity whomped all the other desktop systems reviewed in this issue. In fact, when it comes to all the systems we've *ever* reviewed, the Velocity's closest competition is the Alienware Area 51, which we toyed with last month. In *SYSmark2002*, the Velocity squeaked past the Area 51 with a record-setting score of 260. But the real victory occurred in Game 4 of *3DMark2001 SE*, where the Velocity laid down an amazing 41.9fps, while the Area 51 mustered just 35.4fps. We've only seen crazy Game 4 performance like this from the Polywell Athlon XP box that we reviewed in the May 2002 issue.

MAXIMUM PC KICK ASS PRODUCT

Just as the Polywell performance was a mystery, so is that of the Velocity ProMagix. Can the Game 4 score be ascribed to some type of BIOS trick? A registry tweak? Some *3DMark* hack we just don't know about? We have to wonder, because while the Velocity had stunning scores in Game 4, it couldn't dethrone the Area 51 in our *Jedi Outcast* benchmark. The Area 51 held its record, albeit by a slim margin.

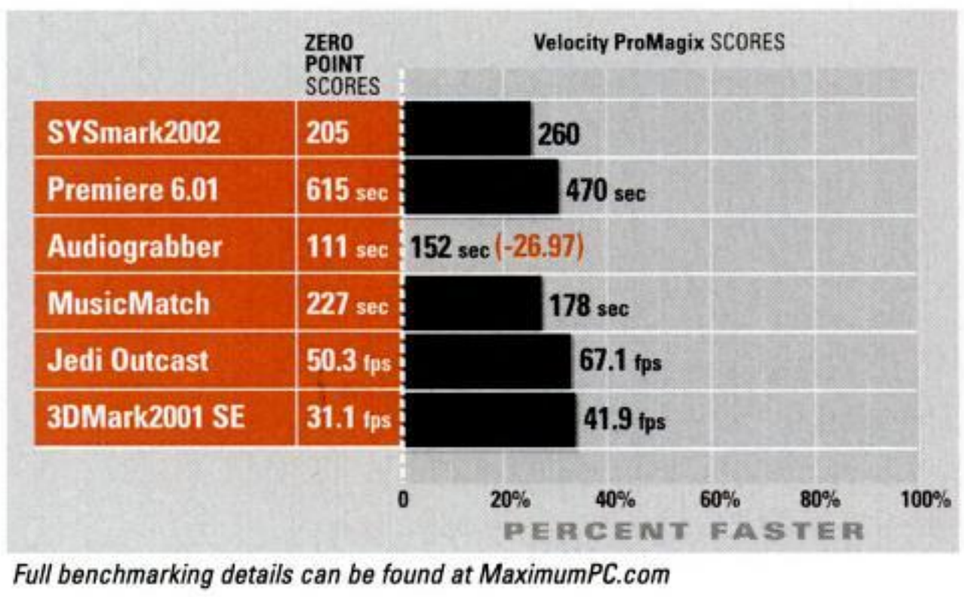
Although Velocity has tried to mitigate system heat with a card cooler, the ProMagix puts its temperature gauge to work. After running our four-hour benchmark session, the case's plastic window felt noticeably warm to the touch. And unlike the Area 51 and Monarch systems, the Velocity ProMagix doesn't have any active cooling on its pair of hard drives.

Other than that, the Velocity ProMagix is a nicely configured and constructed PC that proves the little guys do win once in a while.

—GORDON MAH UNG

UNDER THE HOOD

THE BRAINS	
CPU	2.53GHz Intel Pentium 4B
Motherboard	Asus P4T533-C
RAM	1GB PC1066 (Four RIMMs)
I/O ports	Two PS/2, four USB 1.1, four USB 2.0, two FireWire, two serial, one parallel, Fast Ethernet, Gigabit Ethernet, Gameport, three analog audio out, one analog audio in
DISPLAY	
Videocard	MSI GeForce4 Ti 4600
Monitor	N/A
STORAGE	
Hard drive	Two 120GB WD1200JB Western Digital
DVD burner	Pioneer DVR-104
CD burner	Plextor PX-W4012A
NETWORKING	
LAN	Onboard 10/100 Fast Ethernet, Intel Gigabit Ethernet
SOUND	
Soundcard	Sound Blaster Audigy X-Gamer
Speakers	Klipsch 5.1
MOUSE/ KEYBOARD	
Microsoft Office Keyboard/Microsoft Intellimouse 3.0	
BUNDLE	
Windows XP Professional, Cyberlink *PowerDVD*, Veritas *RecordNow DX*	
BOOT: 44 sec.	**DOWN: 16 sec.**



Full benchmarking details can be found at MaximumPC.com

MAXIMUM PC VERDICT

Velocity ProMagix
VELOCITY MICRO

+ STEVEN SEGAL

Record-setting scores and elite components put the ProMagix in league with the big boys.

– MICHAEL PARE

The Platinum XP case needs a bump in cooling performance to match the quality of its parts.

www.velocitymicro.com
$3,985
9

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Spells punishing: 26,875

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Creatures attacking: 49,438

Prizes on the line: 5,000

1

Deadly strategies: Unlimited

2

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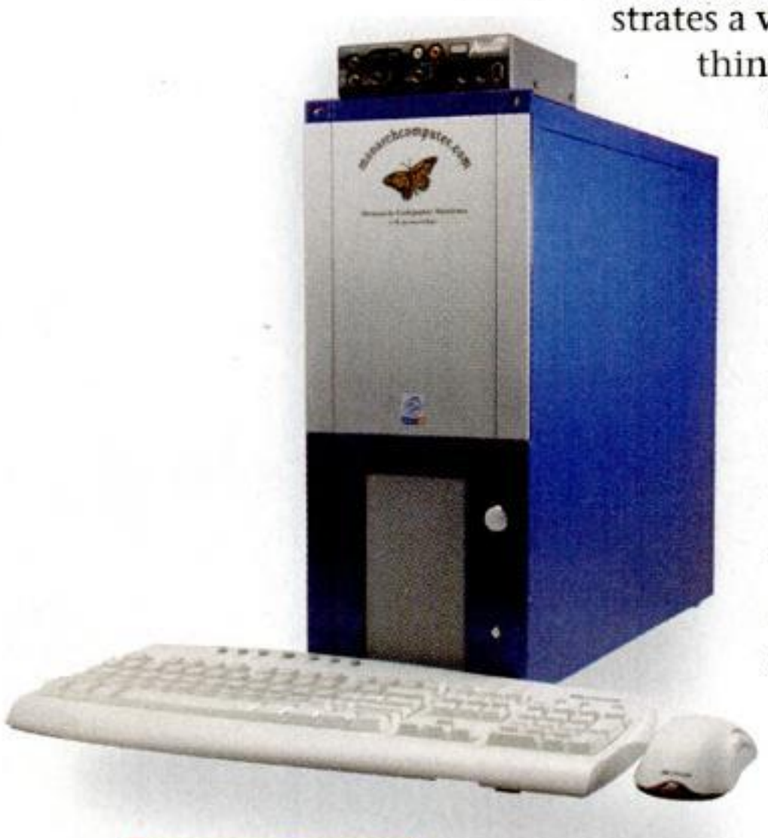
Monarch Champagne Series 8700

Not quite the toast of the town

Monarch's paint job extends to the inside of the Cooler Master ATC-110 case.

The first impression you get when unwrapping the 8700 is just how damned blue it is. Monarch elected to have its Cooler Master ATC-110 case sprayed both outside *and* inside with a deep metallic paint; a nice touch that we haven't seen in an OEM machine for quite a while. Most vendors leave their system interiors naked, which isn't a bad thing if the case has a silky brushed aluminum look. But taking the time to paint the interior demonstrates a vendor's pride in craftsmanship, something that might carry over to other facets of the machine's construction.



And carry over it did—at least for most of the machine's subsystems. Inside the gleaming chassis is an Intel D850EMV2 motherboard with a 2.53GHz Pentium 4 on a 533MHz system bus. This board may not be an overclocking gem, but it's a paragon of reliability and will never leave you dead in the water. In the storage arena, Monarch chose a 100GB WD1000JB Western Digital drive (the one with the audacious 8MB cache) and a pair of optical drives that extract digital audio so fast you'll get a nosebleed. A wicked-looking Leadtek GeForce4 Ti 4600 and a Sound Blaster Audigy External top off the package.

Unfortunately, tender loving care doesn't permeate the entire configuration. Don't get us wrong: The machine is probably superior to 95 percent of all the rigs currently owned by *Maximum PC* readers. And as a 2.5GHz P4 box, the 8700 outperforms all top-rated Athlon machines (the P4 has whipped the Athlon's ass ever since it hit 2.4GHz). Nonetheless, Monarch has the unenviable position of sending us a rig while we're still buzzing off the contact high we received from Alienware's Area 51 rig (reviewed last month) and Velocity Micro's ProMagix (page 58 in this issue). Though all three machines are clocked at 2.5GHz, the Monarch was third in the pack.

Part of the blame must fall on the Monarch's PC800 RDRAM. We'll be the first to concede that getting PC1066 RDRAM is tougher than getting a golden ticket for Mr. Wonka's chocolate factory tour. But Alienware and Velocity Micro were able to offer the world-class memory in their systems, along with RAID 0 hard drive arrays and overclocked videocards. Faster RAM, hard drives, and 3D acceleration will push you over the edge every time. The competition had it; Monarch didn't. And the 8700 certainly has the potential for more speed. With a massive dual-fan heatsink that wraps around the entire videocard, the Leadtek WinFast A250 is just begging to be overclocked.

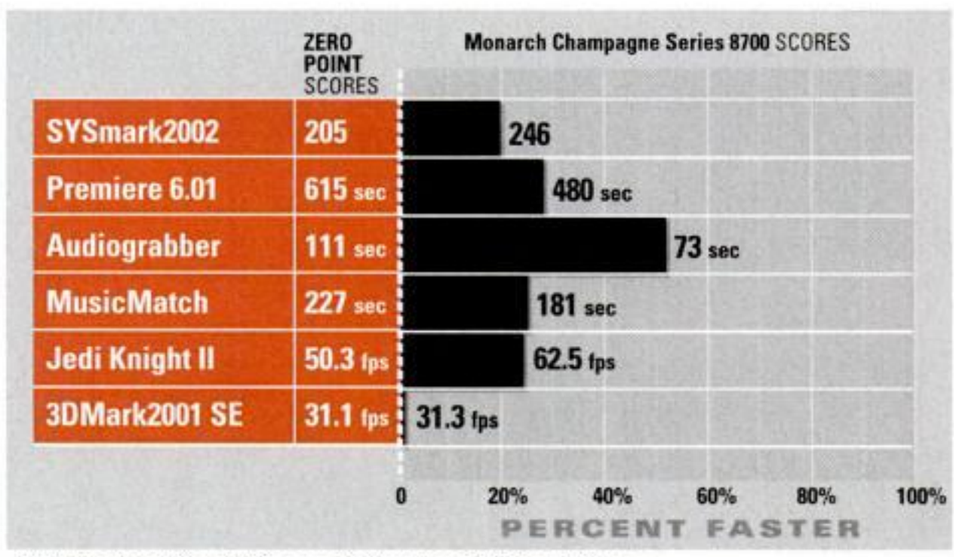
Still, the Monarch was able to reign supreme in the optical drive department. We thought the 32x Lite-On drives in our zero-point systems offered fast CD ripping speeds, but the 40x Lite-On in the Monarch was able extract an entire CD in just 73 seconds!

Anyone who buys the Monarch should overclock the GeForce4 a few ticks, and drop in PC1066 memory (the motherboard does indeed work with PC1066 despite Intel's refusal to say so). In the final analysis, what we have here is a stock sports car with a speed limiter installed for your own personal safety.

—GORDON MAH UNG

UNDER THE HOOD

THE BRAINS	
CPU	2.53GHz Intel Pentium 4
Motherboard	Intel D850EMV2
RAM	512MB PC800 (two RIMMs)
I/O ports	Two serial, one parallel, three analog audio out, mic in, line in, Fast Ethernet, Gigabit Ethernet, 2 PS/2, two FireWire
DISPLAY	
Videocard	Leadtek WinFast A250 Ultra
Monitor	N/A
STORAGE	
Hard drive	100GB WD1000JB Western Digital with 8MB cache
DVD-ROM	Lite-On DVD-ROM LTD163
CD-ROM	Lite-On LTR-40125S
NETWORKING	
LAN	Intel Pro/100, Intel Pro /1000
SOUND	
Soundcard	Creative Labs Audigy Platinum EX
Speakers	N/A
MOUSE/ KEYBOARD	
Mouse/Keyboard	
BUNDLE	
Microsoft Windows XP Professional, Ahead *Nero*	
BOOT: 37 sec.	**DOWN: 8 sec.**



Full benchmarking details can be found at MaximumPC.com

MAXIMUMPC VERDICT

Champagne Series 8700
MONARCH COMPUTERS

+ BEAUTIFUL BUTTERFLIES

Fastest audio extraction ever.

– UGLY MOTHS

Lack of PC1066 RAM hurts overall performance.

www.monarchcomputers.com
$2,569

8

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Compaq Presario 8000Z

Going out swinging

We're not sure if the Presario 8000Z is the last Compaq-branded machine we'll ever tangle with, but if it is, we can testify that the former market-leading company is *not* going gently into the night. This PC is loaded with interesting hardware, and includes none of the fuddy-duddy, proprietary parts that have sullied the Compaq name in the past. What we have here is configuration cojones—it takes a lot of nerve to send us an AMD-based systems these days—and we hope it survives the Hewlett-Packard merger.

The 8000Z comes with a custom (though upgrade-friendly) nForce-based motherboard and hosts AMD's brand-spankin' new Thoroughbred Athlon XP clocked at 1.8GHz. Essentially a die shrink from 0.18-micron to 0.13-micron, the new CPU is virtually the same as the previous version. Unfortunately, just like the GameRigs system we tested last month, the Presario 8000Z can't hold a candle to Pentium 4-based machines. Yes, it outpaced previous Athlon-based systems, but it lagged behind Intel's fastest silicon in every benchmark save our Adobe *Premiere* script.

But that doesn't mean the Presario 8000Z is loaded with last month's hardware. In fact, the rig's list of top-notch components includes a second-generation Pioneer DVD-RW drive, which is perfect for burning your own DVD movie discs and befits any system that performs so well in *Premiere*.

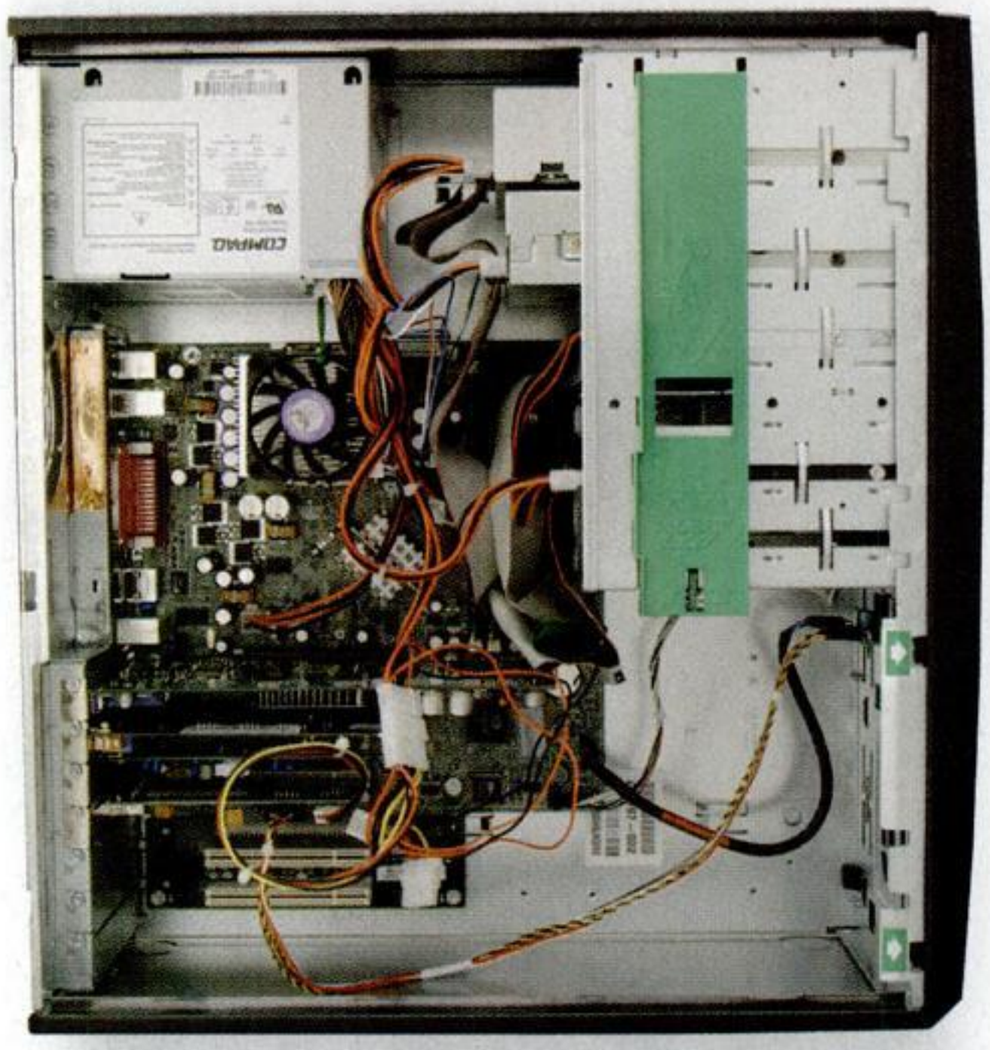
DVD-RW must never be confused with DVD+RW, which suffered one of the most botched technology roll-outs in recent memory: Despite earlier claims to the contrary, the +RW drives will never be able to burn +R media, which offers a greater level of compatibility with existing DVD decks. Compaq was one of the first supporters of DVD-RW, and so far hasn't jumped ship, even though HP, its new master, is behind +RW. To aid in your movie making, Compaq also gives you a six-pin FireWire port on the front bezel (along with two USB 1.1 ports).

Other amenities that one wouldn't expect from a large OEM include onboard Ethernet and a 120GB Western Digital 1200BB hard drive. In the audio department, the Presario is Creative to the bone, with an OEM version of the Audigy pumping sound to a set of new Cambridge Soundworks MegaWorks 510Ds. Cambridge has committed itself to overcoming the bad reputation it's developed since being bought by Creative Labs, and the new speakers make good headway toward that goal.

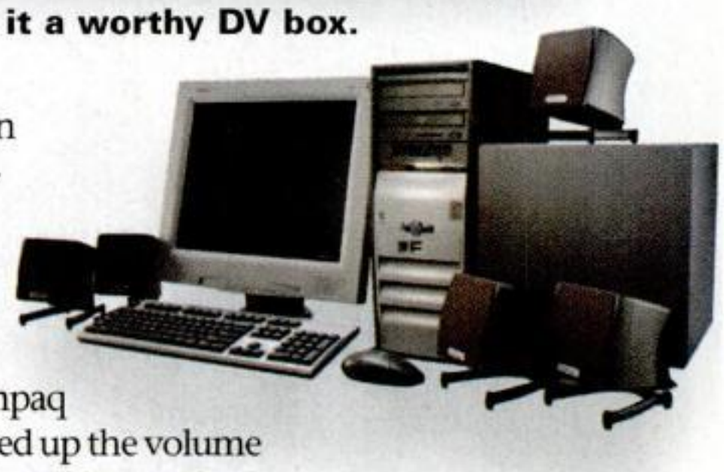
Still, we have to wonder why Compaq went with an nForce 220-D motherboard instead of an nForce 420-D, which includes support for the faster 128-bit DDR memory support. Compaq could have also pumped up the volume by using the 1200JB hard drive, which includes an 8MB cache. But the large OEM did include a full version of *Office XP Professional,* which once again proves that blue-chip system vendors can flex their economy-of-scale muscle when buying software in bulk.

We're glad that Compaq is still in the game because competition only benefits the consumer. You also have to give Compaq props for submitting an Athlon-based system in this age of the 2.5GHz P4s. The 8000Z certainly isn't the fastest system, but it does fit the bill for someone looking for fair performance, a good price, and a real name brand.

—GORDON MAH UNG

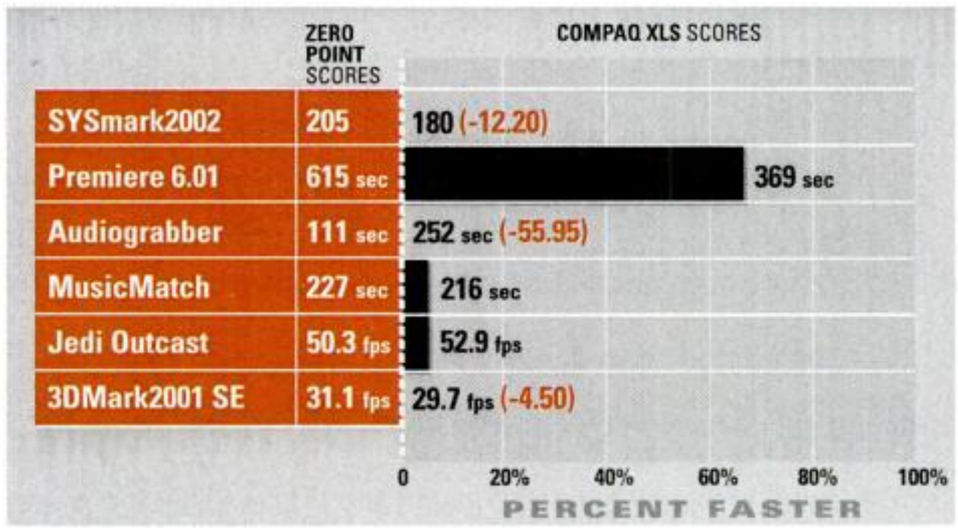


Though eclipsed by Pentium 4 boxes, the Compaq's DVD-RW drive, front-mounted FireWire, and speed in *Premiere*, make it a worthy DV box.



UNDER THE HOOD

THE BRAINS	
CPU	1.8GHz AMD Athlon XP
MOBO	Compaq nForce 220-D
RAM	1GB DDR266
I/O ports	Six USB 1.1, three FireWire, PS/2 mouse, PS/2 keyboard, parallel port, serial port, mic input, VGA, DVI, three analog out, digital audio out
NETWORKING	
LAN	Onboard nVidia MCP Fast Ethernet
DISPLAY	
Videocard	GeForce4 Ti 4600
Display	Compaq 7020 17-inch LCD
STORAGE	
Hard drives	120GB WD1200BB Western Digital (2MB cache)
DVD-ROM	Pioneer DVD-RW DVR-104
CD-ROM	Compaq CD-ROM SC-148E
SOUND	
Soundcard	Sound Blaster Audigy
Speakers	Cambridge Soundworks Megaworks 510D
MOUSE	
Compaq wireless USB	
KEYBOARD	
Compaq PS/2	
BUNDLE	
Windows XP Home, Roxio *Easy CD Creator*, Microsoft *Works, Word, Excel, Access, PowerPoint*, Intuit *Quicken 2002, Norton Antivirus 2002, Coloreal, Netscape 6.2.1, Intervideo DVD 3.2*	
BOOT: 45 sec.	**DOWN: 28 sec.**



Full benchmarking details in the Benchmarks section of MaximumPC.com

MAXIMUM PC VERDICT

Presario 8000Z
COMPAQ

+ GOOD

A second-generation DVD-RW drive and fast *Premiere* scores make it a good box for video editing.

– BAD AND UGLY

The Athlon XP is really showing its age. Where's the Hammer?

www.compaq.com
$3,660 (w/o monitor $3,060)
8

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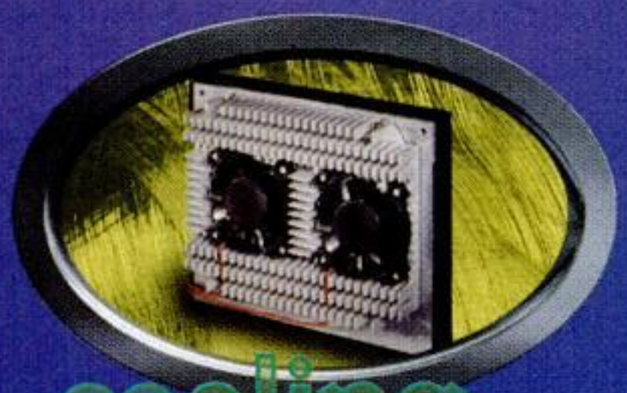

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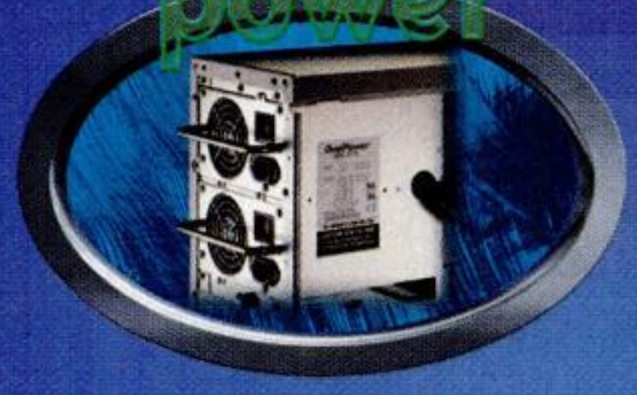

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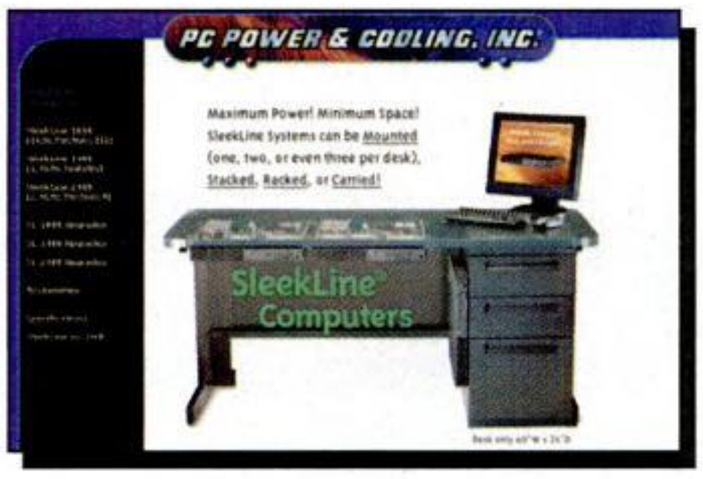
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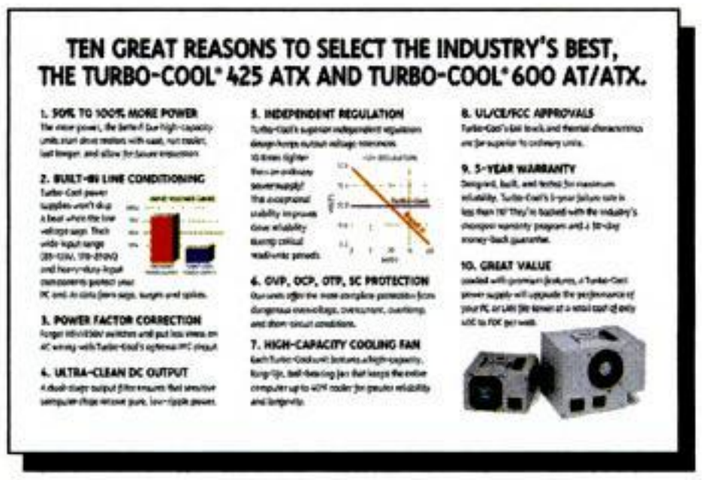
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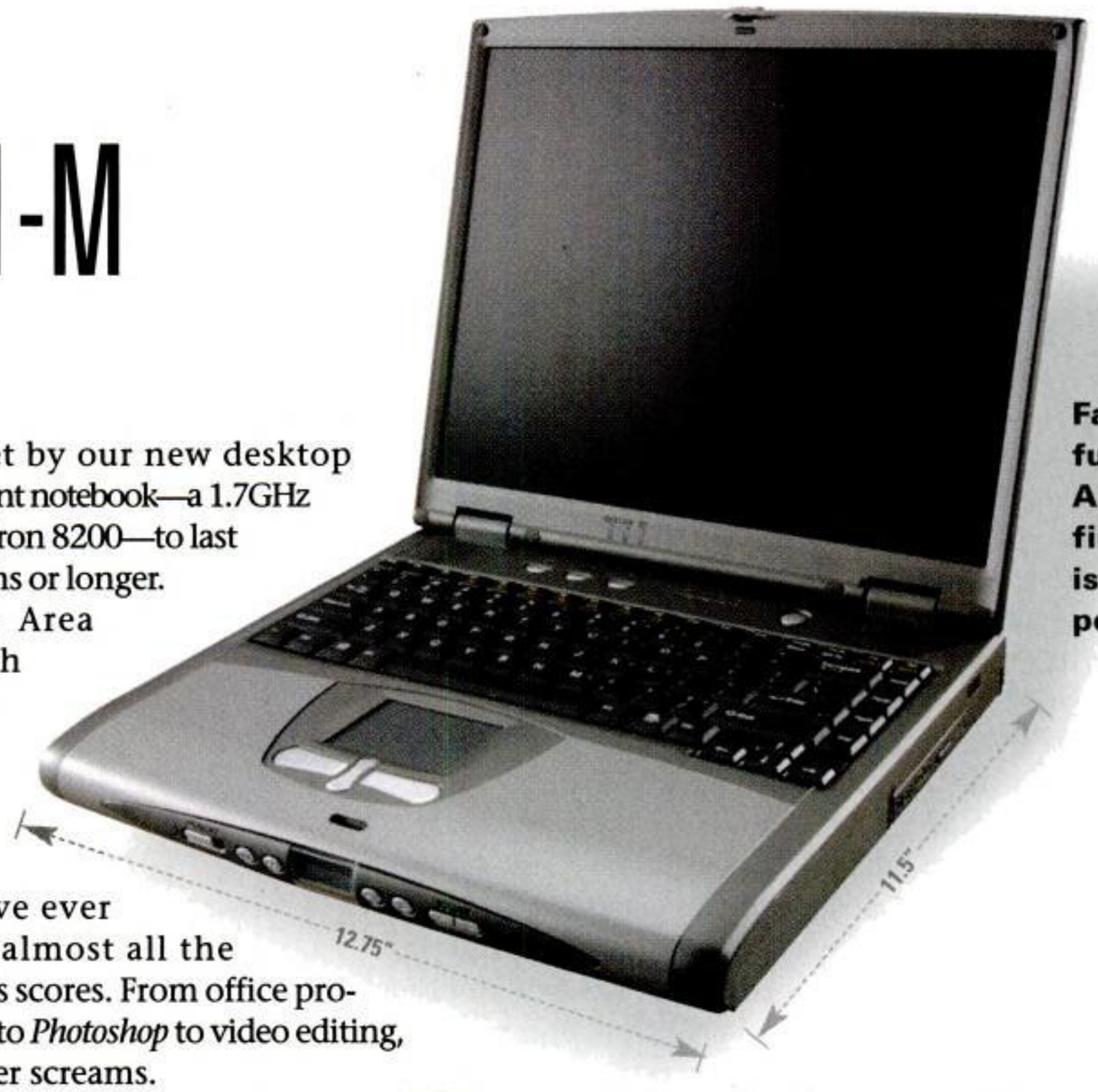
Alienware Area 51-M

A close encounter of the 2.4GHz kind



Fast and furious, Alienware's first notebook is a top-notch performer.

Conspiracy theorists from here to Roswell are abuzz over Alienware's new Area 51-M notebook. But at *Maximum PC* there's been some skepticism. Ever since our benchmarking division investigated the report of a 2.4GHz desktop CPU jammed into Winbook's J4 notebook and found it to be no more than a weather balloon (see July's review), we've been less than enthusiastic about chasing another red herring.

The Area 51-M, however, makes a convincing argument for thumbing one's nose at Intel's MIB department. Intel doesn't sanction the practice of coupling a desktop CPU with a notebook PC for a greater gigahertz-to-price ratio. But after taking the Area 51-M for a spin around the Lab, we believe there may be merits to the unlikely marriage, as the mobile Alienware is the fastest notebook we've ever tested.

In fact, we expected the benchmarks set by our new desktop replacement notebook—a 1.7GHz Dell Inspiron 8200—to last six months or longer. But the Area 51-M with its extra 700MHz turned a death ray unlike any we've ever seen on almost all the Inspiron's scores. From office productivity to *Photoshop* to video editing, this sucker screams.

In a give-and-take showdown with the Dell Inspiron, the Area 51-M took a blow to the head in our *Quake III Arena* test. Chalk it up to better OpenGL performance of the GeForce4 Go in our reference notebook. We also ran *3DMark2001 SE*. At 1024x768, the two notebooks finished in a near–dead heat at 5,002 for the Inspiron and 5,158 for the Area 51-M (both of which are amazing scores compared with the 3000–4000 range that last year's notebooks were clocking). Finally, we ran our *Jedi Outcast* benchmark that's used to test desktops, and the Area 51-M turned in a score that was 25 percent faster than the Dell's. Go figure.

Just like last month's Winbook J4, the 2.4GHz desktop CPU in the Area 51-M drained the batteries too damned fast. Fortunately, Alienware uses a massive 120-watt power supply that provides enough juice to charge the laptop while its in use. On the other hand, the 120-watt power supply tips the notebook's scale to 11 pounds, essentially making the Area 51-M a laptop, not a notebook PC. The power supply also relies on an annoying fan that spins even when the notebook is off and the batteries are fully charged. The notebook itself has three bottom-venting fans that spit superheated air out the left side.

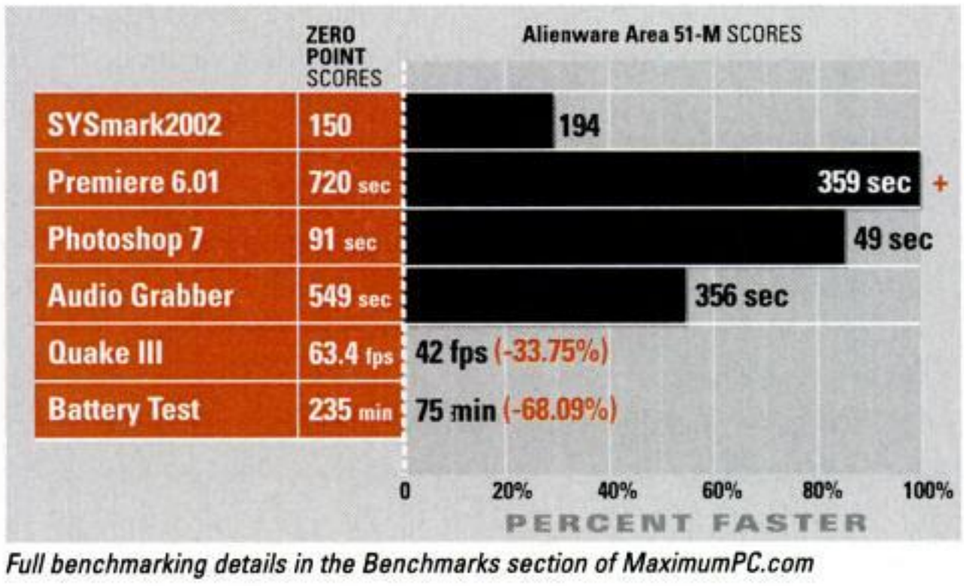
Alienware knows the battery performance won't match that of a notebook armed with a true mobile chip, but that's not really the point of the Area 51-M. It's designed so you don't have to lug a 50-pound tower and 80-pound monitor to your buddy's house. There's nothing worse than having to pack up a mess of gear after an all-day LAN party. With the Area 51-M, you just toss the notebook into the included carrying case and say "buh-bye" to your envious friends.

There's clearly room for improvement in the Area 51-M, such as onboard Wi-Fi and a faster combo drive, but for Alienware's first ever mobile attempt, we're duly impressed. For mobile gamers, a notebook made by a real gaming company should come as a good sign. The Area 51-M portends a massive invasion soon to come.

—GORDON MAH UNG

UNDER THE HOOD

THE BRAINS	
CPU	2.4GHz Pentium 4 (512K full-speed L2 cache)
RAM	512MB DDR266
I/O ports	One Cardbus PC Card slot, one VGA, one S-video, one parallel, four USB 1.1 ports, mic-in, line-in, headphone, IrDA, FireWire, Optical SPDIF, Fast Ethernet
NETWORKING	
Modem	SmartLink 56K Voice Modem
LAN	Realtek RTL8139 10/100 Fast Ethernet
DISPLAY	
Video	ATI Mobility Radeon 7500 (64MB DDR)
Display	15-inch, 1600x1200
STORAGE	
Hard drive	IBM Travelstar 40GB 4,200rpm
CD-RW/ DVD-ROM	Teac DW-28E 8x DVD, 8x CD-R, 4x CD-RW, 24x CD-ROM
SOUND	
Audio chip	Integrated AC97 audio
TIPPING THE SCALES	
Lap weight	9.8 lbs
Carry weight	11.1 lbs
BUNDLE	
Microsoft Windows XP Professional, CyberLink *PowerDVD*, Roxio *Easy CD Creator 5*, *Alien Autopsy Support*	
BOOT: 44 sec.	**DOWN: 11 sec.**



Full benchmarking details in the Benchmarks section of MaximumPC.com

MAXIMUM PC VERDICT

Area 51-M
ALIENWARE

AGENT SCULLEY

Fastest mobile PC we've seen to date.

AGENT REYES

Heavy, hot, and a power guzzler, the Area 51-M really harks back to the days of the laptop, not the notebook.

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9

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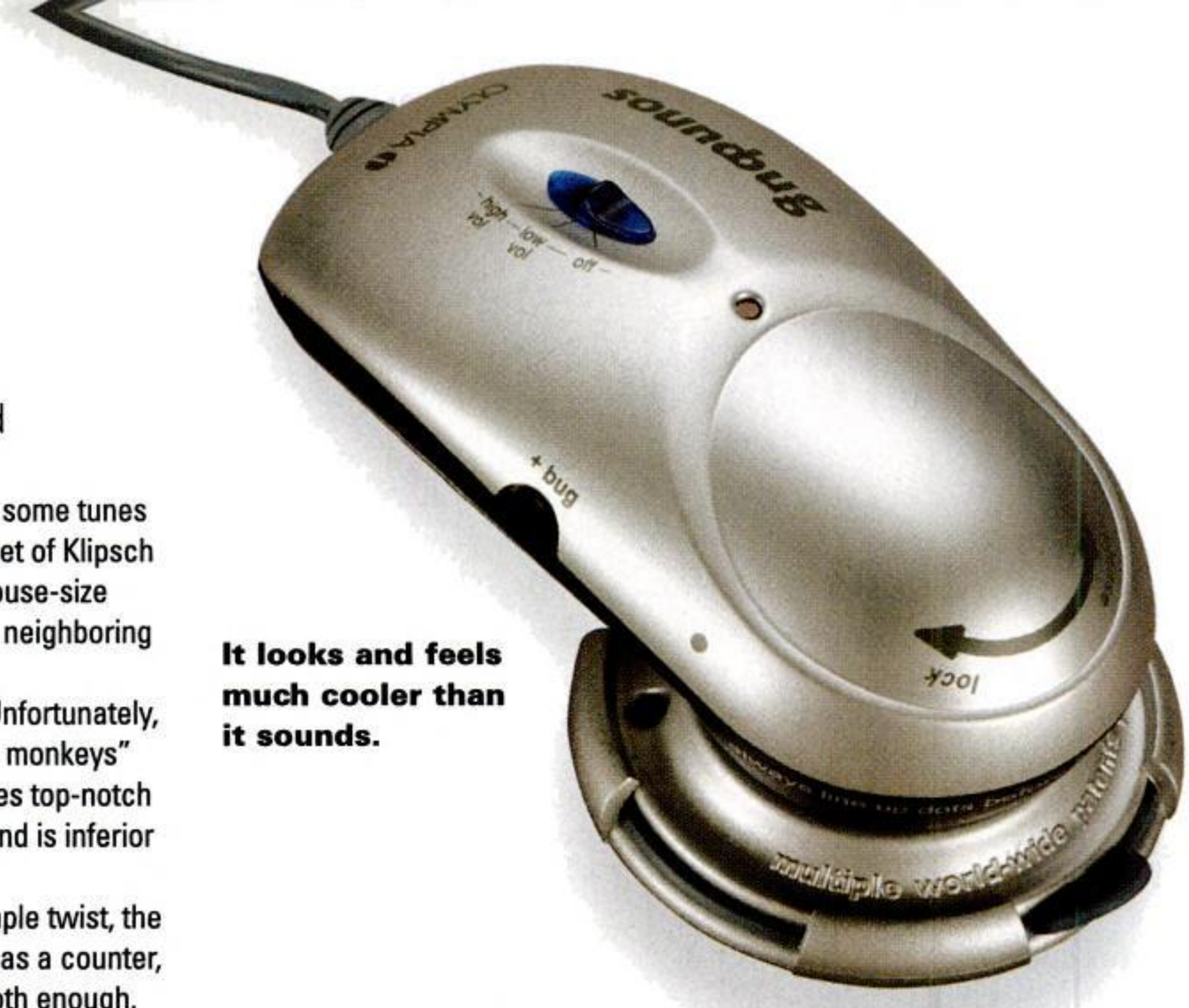
Soundbug

New transducer technology sounds squashed



It looks and feels much cooler than it sounds.

Imagine that you're in a hotel room and you want to rock out to some tunes on your MP3 player or laptop. Instead of having to smuggle a set of Klipsch speakers in your carry-on luggage, you break out Olympia's mouse-size Soundbug, suction it to the nightstand, and treat yourself and the neighboring hotel guests to some sufficiently amplified music.

At least that's how we imagined the Soundbug would work. Unfortunately, we were as disappointed as a kid who receives his order of "sea monkeys" and finds it's just a bag of brine shrimp. Though the Soundbug uses top-notch construction and feels like a quality device, it isn't. In fact, its sound is inferior to that of a notebook PC with even mediocre speakers.

The Soundbug plugs into any 1/8-inch jack device. With a simple twist, the Soundbug can be attached to any hard, nonporous surface such as a counter, a window, or even the side of a computer case if its paint is smooth enough. Using a rare material called Terfenol-D, which was developed by the U.S. Navy and Ames Lab for use in sonar equipment, the Soundbug's element translates a magnetic field into vibrations. It's a technique known as magnetostriction, or magnetoelasticity. A single Soundbug provides mono output, and a second Soundbug can be daisy-chained to the first for a stereo affect.

We tested our Soundbug with an Apple iPod, a Sony VAIO notebook, and a Sound Blaster Audigy soundcard, and attached it to nearly every suitable surface. Indeed, we made every attempt to see if, as Olympia claims, the Soundbug can generate enough sound to satisfy a group of people. In the end, the best we could achieve with even two devices was audio quality that rivals a 1952 AM transistor radio—heck, we would have been happy if it sounded *that* good.

⊕ **MARIA CALLAS:** A perfect match for Altec Lansing's XA3001 subwoofer (page 68), and a lot of fun to try on different objects and body parts.

⊖ **YOKO ONO**: Will make you wonder where your $49 went.

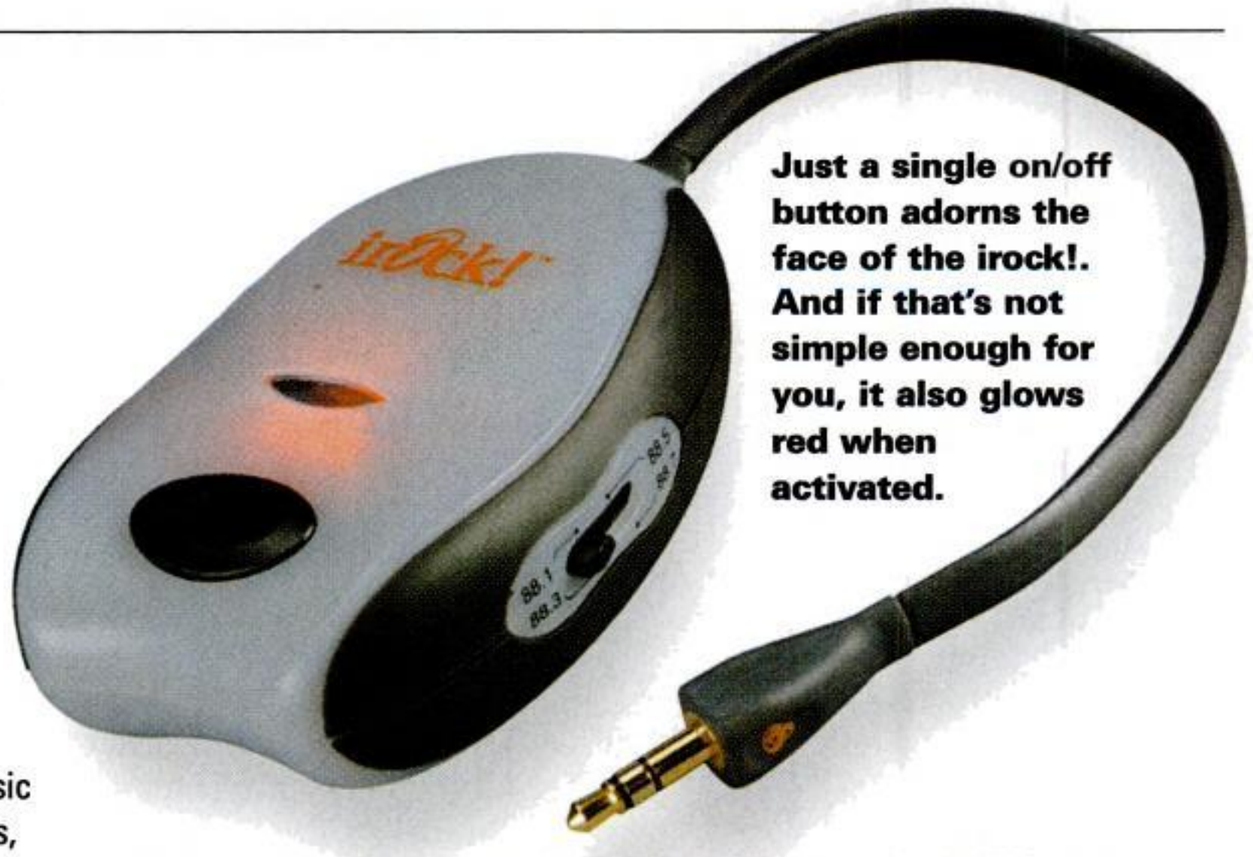
—GORDON MAH UNG

MAXIMUM PC VERDICT: 2

$49, Olympia, www.soundbug.biz

irock! Wireless Music Adapter

Freedom of screech



Just a single on/off button adorns the face of the irock!. And if that's not simple enough for you, it also glows red when activated.

I hate that station—all they play is crap."… "Music today is such crap."… "You can't tune out crap without tuning in other crap."

If you're sick of driving about town to the strains of crappy, corporate radio playlists, the irock! Wireless Music Adapter could give you much-needed relief. Just plug the jumbo egg–size adapter into the headphone jack of any playback device: an MP3 player, a CD player, your boom box… even a phonograph (unless you've already got a '56 Chrysler with the "Highway Hi-Fi" under-the-dash record player). Next, with a small switch on the side of the adapter, select a radio frequency from the four that are offered. Now tune your radio to that station, and sit back as the music of your choosing gets played. Other than installing a couple of AAA batteries, that's as complicated as it gets.

The cable that connects the Wireless Music Adapter to your playback device cleverly doubles as an antennae. But the device takes some positioning to get the best signal. In our test car, we received the clearest signal when the adapter was slung over the rear-view mirror. Not cool. The second-best place was in the (unused) ashtray. This freedom of movement, however minimal, is far more convenient than that of a wired adapter that slides into cassette slots.

The amount of noise you'll hear with the irock! Wireless Music Adapter depends heavily on the quality of your FM receiver, but there's always going to be some hiss in the background, as well as dropouts every now and then that can be attributed to everything from signal interference to bad weather.

The irock! transmitter uses a phase-lock loop control, a specialized circuit that helps the transmitter "lock on" to a specific frequency, minimizing noise and crosstalk as much as possible from adjacent frequencies. In order to comply with FCC regulations (part 15 of the colorful FCC code addresses very short-range and low-power transmitters), the Wireless Music Adapter has a limited service range of about 10 feet. That's *maximum*, so in order to get approval for a device like this, manufacturers need to restrict the operation of their devices to well below this ceiling. And the Wireless Music Adapter definitely falls far short of this limit. But with an effective throw distance of just a few feet, at least you won't have to worry about one thing: Nobody's going to stumble onto your signal and blurt out, "What the hell is this crap?"

⊕ **FUGEES:** It's convenient, wildly inexpensive, and less risky than a hoodlum-attracting new car stereo.

⊖ **LOOGIES**: It's FM, so you'll virtually always have some level of noise. And the transmitter is pretty weak, even for a short-range device.

—LOGAN DECKER

MAXIMUM PC VERDICT: 7

$30, irock, www.myirock.com

■ *Please remember that portable audio devices—with those tiny peepshow screens and their many buttons—weren't designed to be used while driving. Queue up your tunes before starting the car, OK?*

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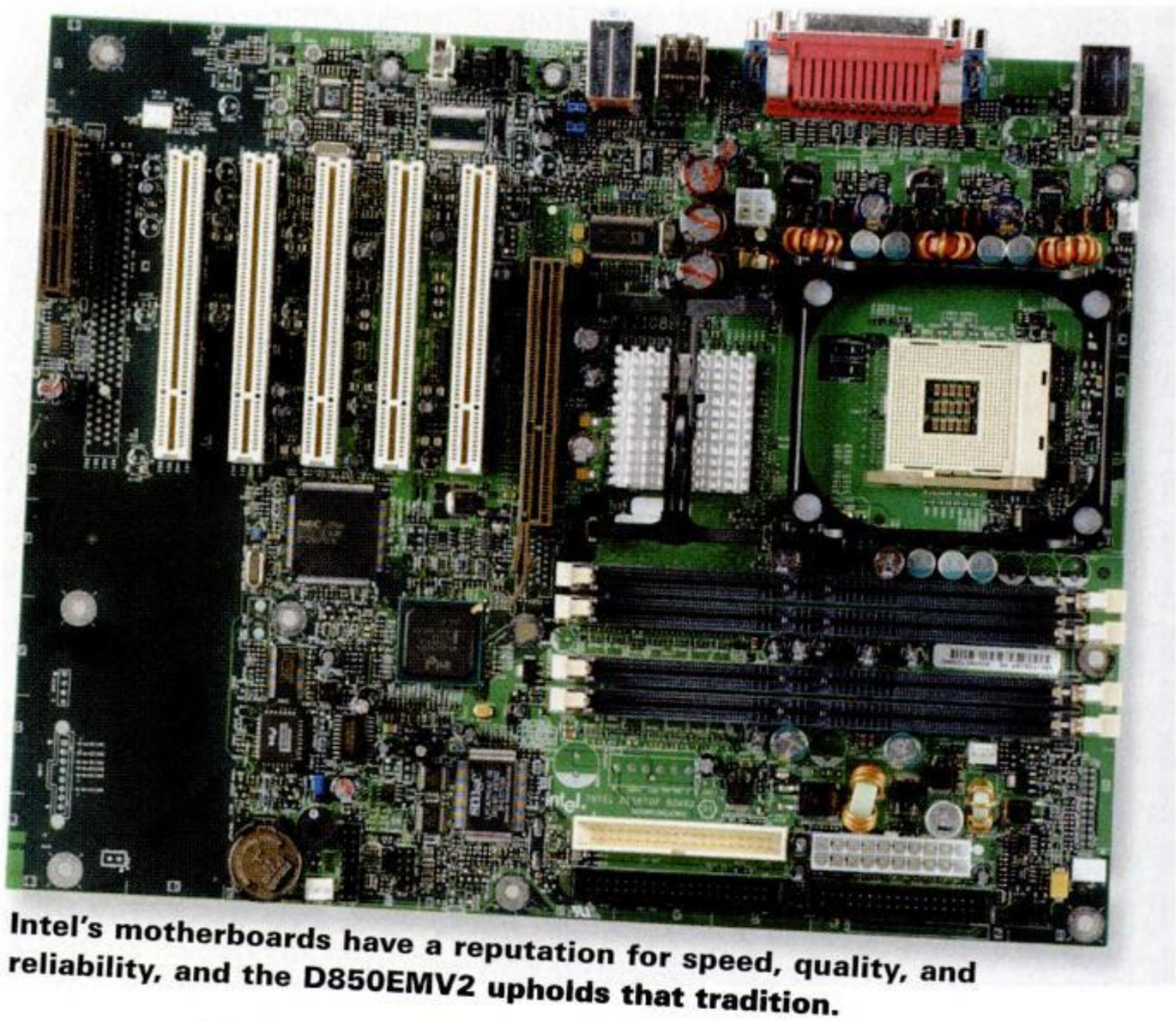
Intel Mobo Melee

DDR333 or PC1066: Which reigns supreme on the 533MHz bus?



Intel's motherboards have a reputation for speed, quality, and reliability, and the D850EMV2 upholds that tradition.

Stop: If you're standing in the computer store with a Pentium 4 motherboard tucked under your arm, just killing time while your buddy plays cat and mouse with the store clerk, take a closer at the mobo box, and make sure the board supports Intel's new 533MHz bus.

The original Northwood Pentium 4, aka the "A" chip, ran on a 400MHz bus (100MHz x 4), but the new Northwood "B" procs run on a 533MHz bus (133MHz x 4). The speed bump gives the P4 a tangible performance boost. Because the new 533MHz motherboards support both A and B Northwoods, you'd be a fool not to buy one. It's not as if the faster bus speed adds any significant cost. It's just an evolutionary improvement that everyone should take advantage of.

In this roundup, we'll look at three boards that embody Intel's new world order. Two boards run the Intel 850E chipset that cohabitates with PC1066 RDRAM, and one runs the new SiS 645DX chipset, which supports DDR333.

Intel D850EMV2

In our June issue motherboard roundup, we were especially hard on Intel's D850MVse for a reason: We wanted you to wait for Intel's follow-up, the mean and green D850EMV2. The new board is very similar to the D850MV2se save for one very important addition—it ditches the Intel 850 chipset for the updated Intel 850E.

Like all Intel-branded mobos, the D850EMV2 is the epitome of straight-laced conservatism. It has five 32-bit/3.3-volt PCI slots, one CNR, a 1.5-volt AGP slot, dual-channel ATA100 support, and onboard audio based on an Analog Devices 1885 CODEC. There's USB 2.0 support, but it's not integrated into the southbridge. Instead, Intel uses an NEC USB 2.0 chip. There are also four RIMM slots that support up to 2GB of PC600 and PC800 RDRAM.

Intel doesn't actually list support for PC1066 RDRAM, but don't let that stop you. In fact, we locked in 32ns PC1066 modules from Kingston, and received a warning message that was about as persuasive as a 55MPH road sign.

During comparative benchmarking, the D850EMV2 lost only to the other RDRAM-based motherboard, the Iwill P4R533, and by just a tiny bit. As expected, the Intel board was fully compatible with our load of add-in hardware: an Adaptec 39160 SCSI card, a 3Com 3C905B NIC, a Sound Blaster Audigy MP3+ soundcard, and a Promise Ultra 66 ATA controller. The board played nice with all the components, as well it should have (if an Intel mobo won't give you stability, then what mobo will?). We also stabbed in four sticks of Kingston PC1066 with nary a burp.

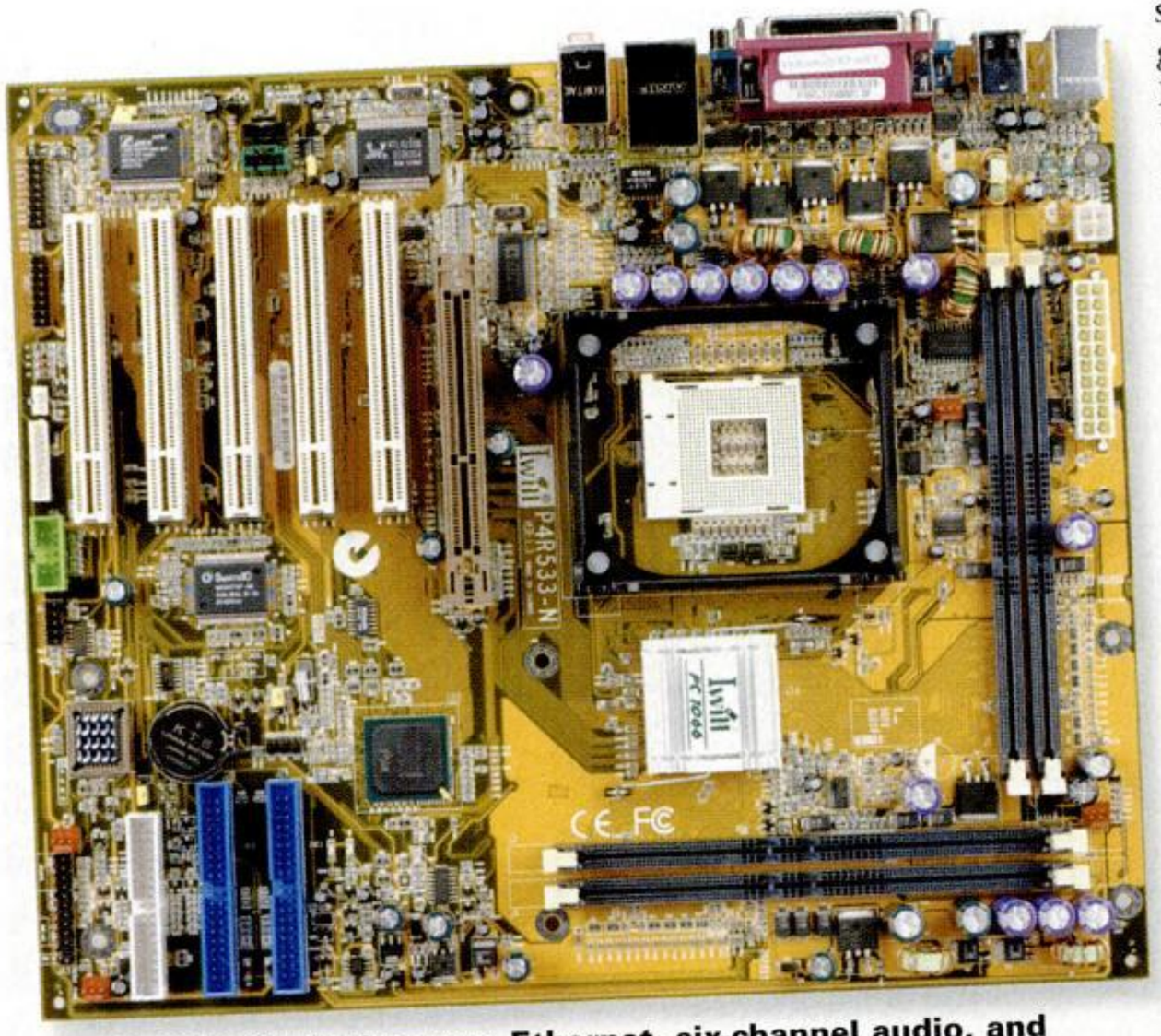
If you're an extreme tweaker who wants every BIOS function unmasked, this isn't the board for you. In fact, you can't access any bus speed or voltage settings. But if you're the kind of person who puckers up when flashing a BIOS, you may have found home sweet home. Intel boards are among the few that can reliably accept a BIOS update from within Windows. The D850EMV2 is rock-stable, and is one of the boards most likely to take you to 3GHz and beyond.

NORTHBRIDGE: Legendary reliability, plus very good performance

BRIDGES OF MADISON COUNTY: BIOS options are sparse, and the board lacks onboard Ethernet.

MAXIMUM PC VERDICT: 8

$160, Intel, www.intel.com



Iwill's P4R533-N gives you Ethernet, six-channel audio, and official support for PC1066 RDRAM.

Iwill P4R533-N

In a June issue preview, Iwill's P4R533-N spanked the competition—and that was with a beta BIOS that would support only the older Willamette P4s. Now, with a production BIOS loaded in, we're happy to report that the P4R533-N lives up to the promise it showed two months ago. In this three-mobo roundup, we had little doubt

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that the two PC1066 boards would be the fastest. But what we didn't expect was there to be much difference between the two 850E-based boards. Well, guess what? The Iwill edged the Intel board in several benchmarks. Same chipset, different performance—one can only assume that Iwill is more aggressive with its BIOS and memory timings.

The board features five 3.3-volt/32-bit PCI slots and a 1.5-volt AGP slot with a neat locking mechanism that prevents your videocard from rocking out of place. So far, very similar to the D850EMV2 (the Intel also has a retention mechanism). But the boards do differ when it comes to amenities. The Iwill includes a C-Media 8738 chip that supports six-channel audio, and an onboard RealTek RTL 1800B Fast Ethernet chip. Though our board didn't come with any, you can also option different plug-in brackets that give you I/O features ranging from coax SPDIF to optical audio connectors. There's also a header for Smart Card and Memory Stick readers.

The Iwill's BIOS includes adjustable frontside bus settings, as well as voltage adjustments for both the AGP slot and CPU. The BIOS in our review board didn't give us manual control over the RDRAM, but we were able to successfully clock our Kingston PC800 RDRAM up to PC1066 data rates without any noticeable problems. We've heard through the grapevine that many lots of PC800 will actually run at the faster speeds without glitches, but proceed with caution—it's your board, not ours.

The Intel board relies on a sticker to let you know where to plug in your on, reset, and front panel lights. But just like the Soyo board, the Iwill has clear markings directly on the motherboard. This can save you a frustrating search on the Internet if you've lost the sticker. Like the Intel board, the Iwill layout is clean and the power connectors are conveniently placed high and out of the way of your rear-mounted fans. Stability testing was blissfully uneventful.

All that said, we do have a few bitches. We think the capacitors are a little too close to the fan bracket, and we're also not into using jumpers to shut off the onboard audio or Ethernet. These are minor points, however, as most people will be able to cope. But where is the stock USB 2.0 support? Iwill offers USB 2.0 only as a PCI add-in option. In this day and age, USB 2.0 should be free.

The Iwill could use a few more features, but it's definitely the fastest motherboard here.

⊕ **CPU:** Fastest in the bunch and "officially" supports PC1066.

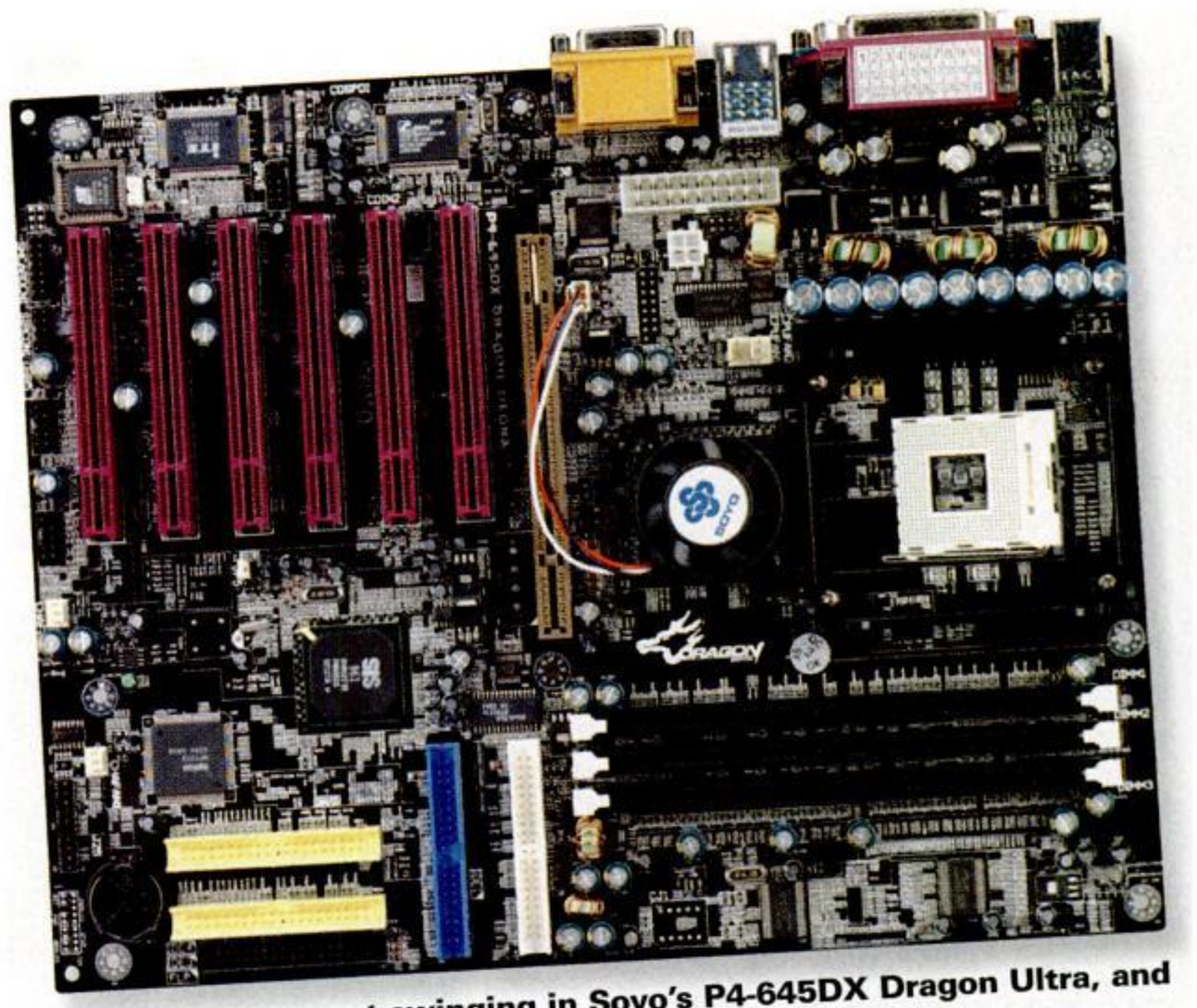
⊖ **C-3PO:** USB 2.0 and RAID would make this board a Kick-Ass choice.

MAXIMUM PC VERDICT: 9

$160, Iwill, www.iwillusa.com

Soyo P4-645DX Dragon Ultra

Ask an old-timer about Silicon Integrated Systems' Socket 7 chipset, and you'd think that he was describing a Yugo. How times have changed. SiS chipsets have improved, and this Soyo P4-645DX Dragon Ultra sure ain't a B-grade Socket 7 motherboard.



DDR333 comes out swinging in Soyo's P4-645DX Dragon Ultra, and the board sports a nifty USB 2.0 box that mounts in a drive bay.

Dig the specs: Six 3.3-volt/32-bit PCI slots, one AGP Pro universal slot, ATA133 and ATA133 RAID support, and onboard Ethernet. There isn't onboard USB 2.0 support, but Soyo includes a VIA chip–based USB 2.0 PCI card along with a nifty USB panel that front-mounts into a 5.25-inch drive bay.

But the real story is how DDR333 performed against RDRAM. We long ago decided that DDR266 just wasn't competitive against RDRAM and wondered aloud whether DDR333 would fare any better. Well, after running benchmarks, we can state that DDR333 is competitive with PC800 RDRAM, but is simply outclassed by the new, faster (and rarer) PC1066. Mind you, for our tests, we could clock our DDR333 memory at only CL2.5 speeds, not the faster CL2 rates. We suspect, however, that even if you could get CL2 DDR333 (rarer than even PC1066), it would still have a hard time against PC1066 RDRAM.

As it is, the Dragon Ultra's SIS645DX chipset fared the worst in the synthetic memory benchmark *SiSoftSandra 2002*. It was fully 28 percent slower than the PC1066 in the Intel board. In *SYSmark2002*, the Soyo was about 7 percent slower than the Iwill, and about 5 percent slower than the Intel. We also saw the SIS645DX fall behind the Iwill's 850E chipset in *3DMark2001 SE* by 11 percent.

Overall, DDR333 doesn't compare to RDRAM. But the good news is that the Soyo Dragon Ultra didn't cough up any hairballs in our hardware compatibility testing, and even functioned with all three DIMM slots filled. We had scheduled a VIA P4X333 motherboard for this roundup, but the VIA board failed to run when more than one DIMM slot was filled. So Soyo's reliability success is worth noting.

Overall, we're very impressed with the Dragon Plus board. Though we still recommend that you use RDRAM for your Northwood P4s, we don't think anyone should be ashamed to buy this motherboard.

⊕ **PCB:** Features galore and stability from an SiS chipset.

⊖ **QVC:** DDR333 can't compete with PC1066 RDRAM.

MAXIMUM PC VERDICT: 8

$160, Soyo, wwwsoyousa.com

—GORDON MAH UNG

DARE TO COMPARE

Make	Intel	Iwill	Soyo
Chipset	Intel 850E	Iwill 850E	SIS645DX
Model	D850EMV2	P4R533-N	P4-645DX Dragon Ultra
SiSoft 2002 RAM Composite	3252MB/s	3365MB/s	2525MB/s
SYSmark2002	238	246	228
3DMark2001 SE	11,564 marks	11,721 marks	10,974 marks
Quake III Arena "Normal" Audio disabled demo1	320.9fps	331.4fps	295.0fps

For testing, we used a 2.4GHz B Pentium 4, 512MB of Kingston PC1066 RAM and 512MB of Crucial DDR333, a 120GB WD1200BB, a Reference GeForce4, a 3Com 3C905B, an AVC Sunflower Heat Sink, a Toshiba M1502 DVD-ROM, a PC Power and Cooling Silencer 400, and Windows XP Professional.

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FireWire Fourgy

Four portable FireWire hard drives get down and play Twister!

SmartDisk 5GB FireFly

A portable hard drive ought to be able to tote innumerable files and transfer them with reasonable speed. And, ideally, it should also elicit audible gasps when you whip it out in front of colleagues. SmartDisk's 5GB, 4200rpm FireFly does both. Weighing less than four ounces, the FireFly is smaller than an Altoid tin. The mysterious SmartDisk logo at the front of the drive lights up blue when the drive is plugged in, and the FireWire symbol on the rump glows orange when the drive is transferring files. The drive is bus-powered, so you'll need to hook it up to a laptop or desktop PC with a six-pin FireWire connector (four-pin connectors don't provide enough juice).

THE GIG TEST

1GB Write: 3:33
1GB Read: 1:41

Like all the FireWire drives pictured here, no funky installation is necessary. The package includes a three-foot FireWire cable, a quick-start card and CD with instructions, and a cushy padded case that feels like a wetsuit.

SUGAR: Unlike most "pocket drives," the FireFly doesn't require cargo pants to carry it around.

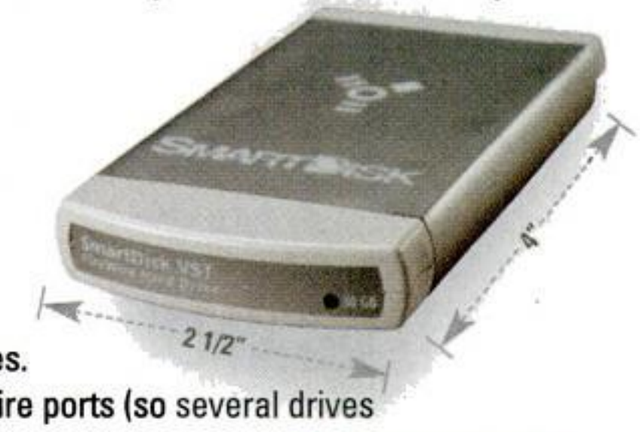
BOOGER: Tiny rubber strips along the interior edges of the FireFly are the only shock-protection, so handle with care. Much higher cost-per-gigabyte than the Thin Drive, and slower to boot.

—LOGAN DECKER

MAXIMUM PC VERDICT: 8

$200, SmartDisk, www.smartdisk.com

SmartDisk 30GB Thin Drive (Titanium Edition)



Portability, capacity, reasonable price—choose two. That's usually the bargain you have to strike with external hard drives. The 30GB Thin Drive, however, offers all three features.

MAXIMUM PC KICK ASS PRODUCT

The Thin Drive includes two FireWire ports (so several drives can be daisy-chained), a FireWire cable, and an AC adapter. Although the Thin Drive is bus-powered, the AC adapter can rescue you if you're forced to plug the drive into an unpowered, four-pin connector. A single, unobtrusive green light signals the drive's activity.

THE GIG TEST

1GB Write: 2:37
1GB Read: 1:29

The design is Mac-like, and we mean that in a good way. It has a reassuringly solid build a soft gray finish, and even includes thin, flat rubber feet that prevent the drive from skidding around when you move the FireWire cable. Although the Thin Drive—like SmartDisk's FireFly—uses a 4200rpm drive, it has a much faster data transfer rate.

VULPINE: An AC adapter, a sturdy case, and an extra FireWire port.

BOVINE: We'd love to be able to get into the interior of the case, for swapping in a larger drive in the future.

—LOGAN DECKER

MAXIMUM PC VERDICT: 9

$260, SmartDisk, www.smartdisk.com

Maxtor 160GB 3000XT

With 160GB at its disposal, the 3000XT could probably eat the contents of your desktop's hard drive twice over, and still have room to burp. The 3.5-inch Ultra ATA 133 hard drive inside would be toasted by most any desktop drive being sold in new systems these days, but as a backup drive or media server, you couldn't beat it with a stick.

THE GIG TEST

1GB Write: 1:07
1GB Read: 0:44

The 3000XT is probably best left at home. It's by far the largest of the roundup, and at nearly three pounds, you're going to feel every gig on your shoulders after a few blocks. The 3000XT is *not* bus-powered. It requires the included AC adapter to operate. The shock-protection is minimal, comprised of just a single rubber gasket running around the circumference of the drive.

But what do you get in return for bulkiness? An extra FireWire port for chaining. A handsome, stackable, modular design. And one gig of files moved from the 3000XT to a PC in less than 45 seconds.

SEINFELD: Massive storage capacity in a drive that reads and writes faster than any other portable in our roundup.

RUMSFELD: It's not the most convenient drive on the go.

—LOGAN DECKER

MAXIMUM PC VERDICT: 8

$400, Maxtor, www.maxtor.com

WiebeTech 1GB FireWire Keychain

Who would have thought that $370 could buy you the world's smallest *anything*, much less a 3600rpm, 1GB hard drive the size of a Compact Flash card? And for a mere $30 more, you can get the MicroDrive bridged to a FireWire port in WiebeTech's FireWire Keychain.

THE GIG TEST

1GB Write: 10:35
1GB Read: 7:01

The FireWire Keychain (also available without a MicroDrive for $100) is a bus-powered adapter that can accommodate IBM's MicroDrive as well as Compact Flash cards, which use the same kind of interface. While both these devices can be plugged into PCMCIA card adapters, you'll get much faster throughput using the FireWire Keychain. The shock-protection consists of a couple pads along the bottom and one side of the MicroDrive, but this is adequate for pocket jostling. We're a little apprehensive about the aluminum case, however. It has to be painstakingly unscrewed to swap the MicroDrive with Compact Flash, and after extended use, the case heats up like a little sweatbox.

SWANK: Makes our flash memory–based keychains seem wimpy.

STANK: The MicroDrive is comparatively slow and expensive.

—LOGAN DECKER

MAXIMUM PC VERDICT: 7

$400, WiebeTech, www.wiebetech.com

■ *The Gig Test transfers slightly less than 1GB of large and small files to the external drives, then reads these same files back to a different directory on the PC.*

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Altec Lansing XA3001

Even seemingly good ideas can go horribly awry

What if your PC came with a decent set of speakers, but no subwoofer? What if you'd like a little more punch, but don't want to shell out big money for a 2.1 speaker rig and throw away the two perfectly serviceable speakers you're using now? Why not just buy a stand-alone subwoofer? When we first heard about the XA3001 subwoofer from Altec Lansing, we thought it was a fabulous idea. But now that we've actually used the sub ("heard the sub" wouldn't be an accurate statement), our tune has changed.

The XA3001 is simply a stand-alone 5.25-inch subwoofer in a ported enclosure. Because most speaker systems aren't designed to accommodate an add-on sub, the XA3001 uses a pass-through connector that integrates with your existing speaker set—the sub attaches to your PC, while your existing stereo speakers attach to the sub. Crossover occurs at 150Hz, but the sub is rated for just a puny 30 watts, rendering it woefully inadequate. The question isn't, "How bad does it sound?" but rather, "Is it making any sound at all?" Seriously, the faint thump of the sub was so overwhelmed by the volume of our satellites, we had to literally unplug the sats in order to make sure the subwoofer was actually turned on and operating.

But that's not all: Unlike normal PC speakers that connect to your PC using a mini-headphone jack, the XA3001 uses RCA adapters for both input and output. This scheme is better-suited to connecting the sub to a TV than a PC, and sure enough, we had to buy a set of mini-to-RCA adapters to cable the sub to our commonplace PC speakers. Totally unacceptable.

There are a few nice things to say about the XA3001. Although it doesn't crank out much in the way of sound, we can't detect anything inherently flawed with its design. We blame the poor sound more on the shoddy 5.25-inch driver than a fundamentally crappy enclosure. In fact, had the XA3001 sounded better, we probably would have complimented its aesthetics.

It looks like a bomb because it is a bomb. Of course, if Altec Lansing wanted it to look like it sounds, it would be shaped like a little girl.

We can't think of any reason why anyone would want to blow $50 on this hunk of junk.

AN ANGELIC CHOIR: This subwoofer didn't make our computer explode.

FINGERS ON THE CHALKBOARD: Subwoofers are supposed to make noise, right?

—WILL SMITH

MAXIMUM PC VERDICT: 2

$50, Altec Lansing, www.alteclansing.com

Thrustmaster Tacticalboard

Thrustmaster builds a better keyboard

We've all seen the sad parade of piss-poor game controllers "designed especially for first-person shooters." But very few of us have ever used a specialty controller that could take the place of the traditional computer keyboard, however accidental its utility may be.

Enter Thrustmaster's new Tacticalboard. With 49 totally programmable buttons laid out in a keyboard-like configuration, it left us quite impressed. Not only can you program any game control function to any controller button, you can also program complex macros. This means the Tacticalboard isn't all that easy to use right out of the box. But once you do configure it to your personal liking, your gaming experience could improve measurably.

Single-player gamers and casual online gamers need not bother with this many programmable keys. However, the Tacticalboard is perfect for the competitive online gamer who uses dozens of keys to tell his comrades everything from his current map location to weapons loadout. On a typical keyboard, the ASDW and ESDF movement keys sit miles away from the macro keys, so switching from one area of the keyboard to the other is a bloody pain. But all of the Tacticalboard's keys are within close proximity of each other, so you can hit anything you like without having to reposition your hand. In fact, the keys on the circular T button console can be easily manipulated with just your thumb. Even better, you can program all the key presses that are required to purchase weapons in games like *Counter-Strike* to a single key, thus giving you one-touch access to all your default weapon configs.

The Tacticalboard isn't perfect. We would have preferred the traditional inverted T layout for movement controls. We were also disappointed that instead of licensing a voice chat program that's already in wide use (such as *Roger Wilco* or Microsoft's *GameVoice* software), Thrustmaster bundled *Teamsound*. No one uses *Teamsound*—so you won't either.

Despite its funky shape, the Tacticalboard is totally adjustable and was comfortable for people with different sized hands.

If you're serious about multiplayer first-person shooters and are unhappy with your keyboard, give the Tacticalboard a try. In the right hands, it could be a revelation.

COUNTER-STRIKE: Everything an online gamer needs, from an ergo key layout, to voice chat, to oodles of programmable buttons.

HEXEN II: The voice chat software is obscure, and the programming interface, while flexible, is somewhat confusing.

—WILL SMITH

MAXIMUM PC VERDICT: 9

$60, Thrustmaster, www.thrustmaster.com

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Diskeeper 7.0

Better than your average defrager

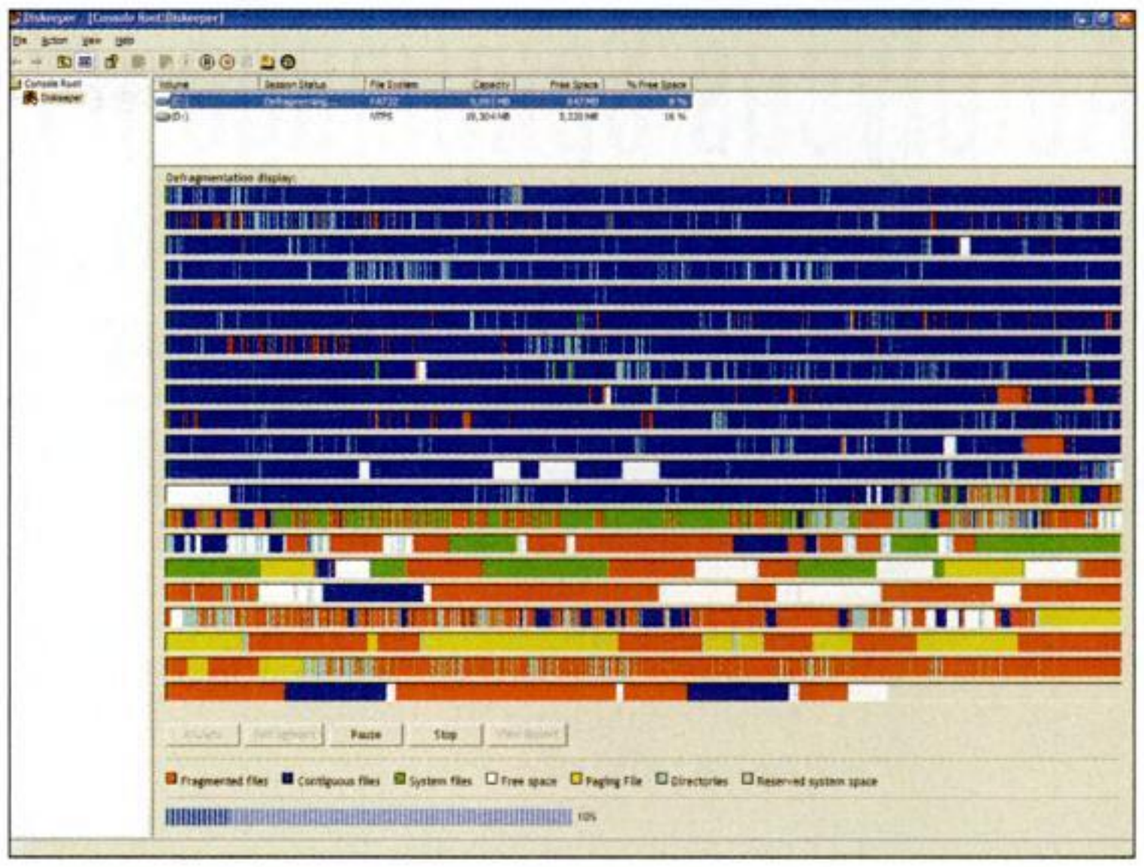
MAXIMUM PC KICK ASS PRODUCT

In the dark days of Windows NT, Microsoft claimed that NTFS didn't need defragmenting. Then when Windows 2000 was launched, Microsoft realized the error of its ways and included a crippled version of Executive Software's *Diskeeper* with the OS. Windows XP ships with a similar version of the popular NT defragmentation software as well.

So what do you get with the retail version of *Diskeeper* that you don't get with Windows? The full-fledged app not only defragmented our test system faster than the default Windows defrag software, it also added some very useful features. Our favorite is Executive's "Set it and Forget it" scheduling tool. Most defrag software requires you to manually start and run a program, but with proper configuration of its scheduling tool, *Diskeeper* will run automatically in the background, based on your preferences. Naturally, no one wants his defrag program to fire up while he's in the middle of a heated deathmatch, so *Diskeeper* offers a couple options on the automatic defrag front. You can schedule the defrag to run when you know you'll be away from your PC, or you can opt to enable "Smart Scheduling," which monitors the rate at which your disk becomes fragmented, then schedules defrag runs accordingly.

Diskeeper will also do boot-time defragmentation, which is the only way to defrag system files, your paging file, and the Master File Table (MFT) of NTFS volumes. You can schedule the boot-time defragmenter to run either the next time you reboot or at a scheduled time. Furthermore, after you've defragmented your MFT and paging file, "Frag Guard" keeps them from getting fragmented again by ensuring these files have room to grow contiguously.

If you're tired of baby-sitting your disk defragmenting software, grab a copy of *Diskeeper 7.0*. Your disks will thank you.



Red is bad, blue is good. *Diskeeper 7.0* makes the red go away!

⊕ **SESAME STREET:** Install the software, configure it, then never worry about defragmenting your disks again.

⊖ **MR. ROGERS:** Some people might not want to pay $50 for something that should have been included with Windows. We'd also like to see a wizard that walks people through the more advanced settings.

—WILL SMITH

MAXIMUM PC VERDICT: 9

$50, Executive Software, www.execsoft.com

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Autolycus SpinImage DV

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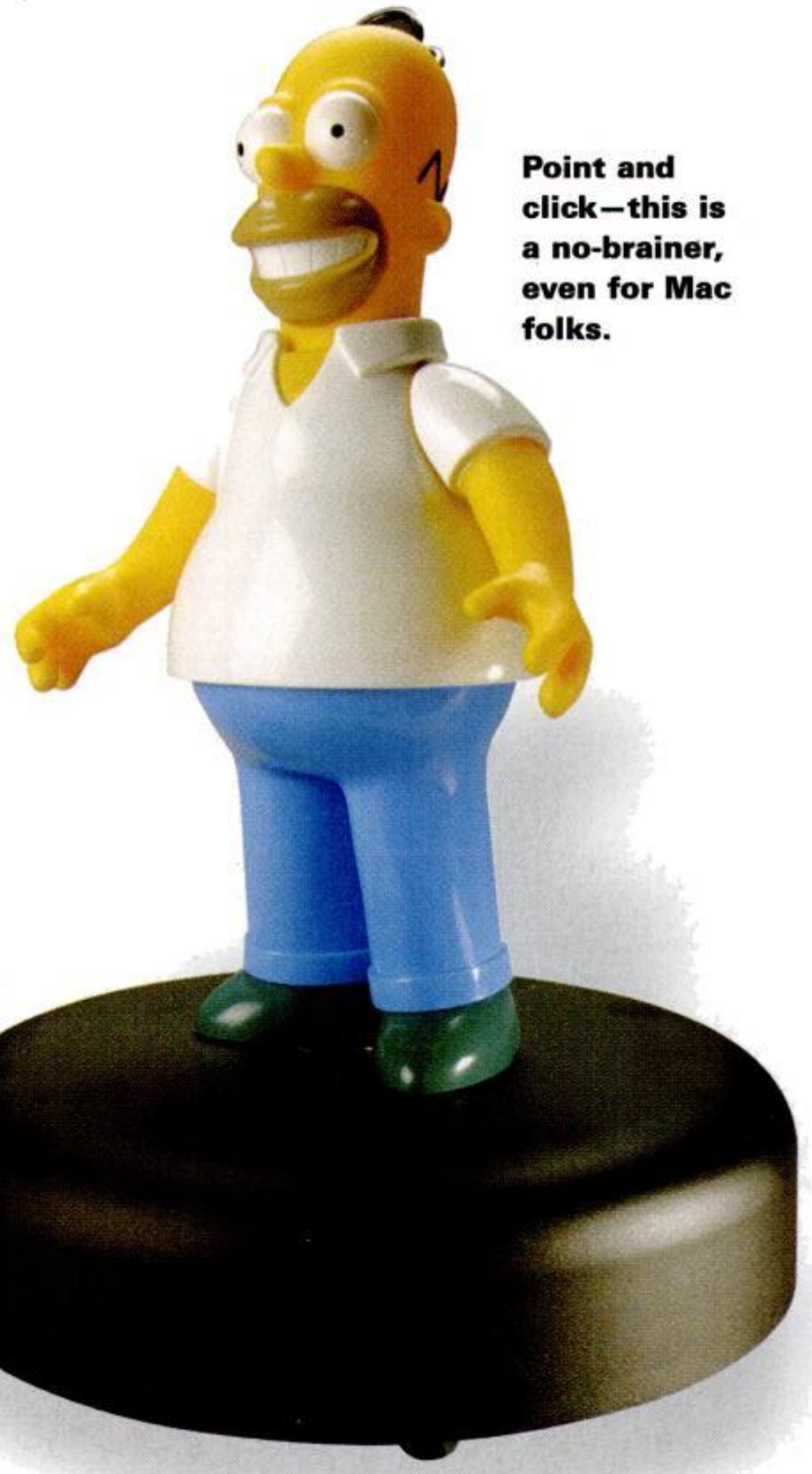

Point and click—this is a no-brainer, even for Mac folks.

SpinImage DV is a combo hardware/software package that allows you to make those cool 360-degree images that you can spin and twirl at will. Most of these image files are made with *QuickTime VR*, a relatively difficult program to master. But Autolycus's new kit simplifies the creation process for average consumers. Although the package's price isn't exactly cheap, and setting up ideal lighting conditions and backgrounds remains a tricky process, *SpinImage DV* still has more merits than *QuickTime VR* for rank beginners.

Here's the two-sentence primer for people who aren't hip to user-navigable panoramic imagery: When you load a web page that features one of these pics, you see a basic image, nothing special. But if you click on the image and drag, its perspective will rotate. Realtors often use this technique to show off properties: Just drag your mouse across a horizontal plane, and you can see all four walls of a master bedroom. The images are also great for showing off a single small object from every possible angle. For example, you could click and drag on a picture of a notebook to view the machine from the front, back, and both sides.

To simplify the process of making panoramic images of small objects, the *SpinImage DV* kit includes an electric turntable. Just place your object on the turntable, then position your video camera directly in front of the object (digital video is preferred). Now hook the DV cam to your PC via a FireWire interface, and the *SpinImage DV* software will automatically recognize the camera in order to stream its video to a simple capture window. Once that's done, start the turntable spinning, then click the capture button with your mouse. *SpinImage DV* will auto-capture a series of stills, then arrange them into a panoramic sequence that can be previewed, adjusted, and exported as either a standard QuickTime VR file or a SpinImage file (which is just a series of JPEGs embedded with JavaScript). Image resolution is limited to 320x240; the three different quality settings vary only the frame rate.

It can't get any simpler than this.

You also have the option of using previously recorded AVI files in case you want to shoot something while not connected to your PC. If you want to take an environmental shot, put your DV camera on a tripod, place the tripod in the middle of the environment (your car, bedroom, the Grand Canyon, wherever), then spin the tripod 360 degrees while shooting. The resulting video can be loaded into the *SpinImage DV* software and processed accordingly.

What's most exceptional about *SpinImage DV* is the sheer speed of its out-of-the-box experience—we went from start to finish in less than 30 seconds once we were set up. And the inclusion of a high-quality turntable addresses the single roadblock that most people have when messing with *QuickTime VR*—getting those damn stationary objects to spin just so. We also appreciate the bundled white turntable cover, which gives you a better blend if you're using a white background.

On the flipside, the basic *SpinImage DV* package doesn't offer any adjustments for frame rates aside from the three basic quality settings—CD, Broadband, and Dial-up. For greater frame rate control, you'll need to upgrade to the Pro level package, which at $1000 is a bitter pill to swallow. Fortunately, most people will be satisfied with the simple quality options. After all, a 24fps panoramic image at any decent resolution would require an immense amount of bandwidth.

Despite our minor quibbles, *SpinImage DV* impressed us. The program's simplicity limits its functionality, and the price is a doozy. But if you're a realtor, eBay seller, or even just an ambitious web site designer, *SpinImage DV* will leave you satisfied.

—JOHN TUMMINARO

MAXIMUM PC VERDICT

Autolycus SpinImage DV
AUTOLYCUS CORPORATION

+ THE SIMPSONS HALLOWEEN SPECIAL

Really, really easy to use, produces instant results, and is a boon for people who sell stuff on eBay.

– MARTHA STEWART THANKSGIVING SPECIAL

The price is a little steep considering that most of the flexibility of the pro version is missing.

www.autolycus.com
$400
8

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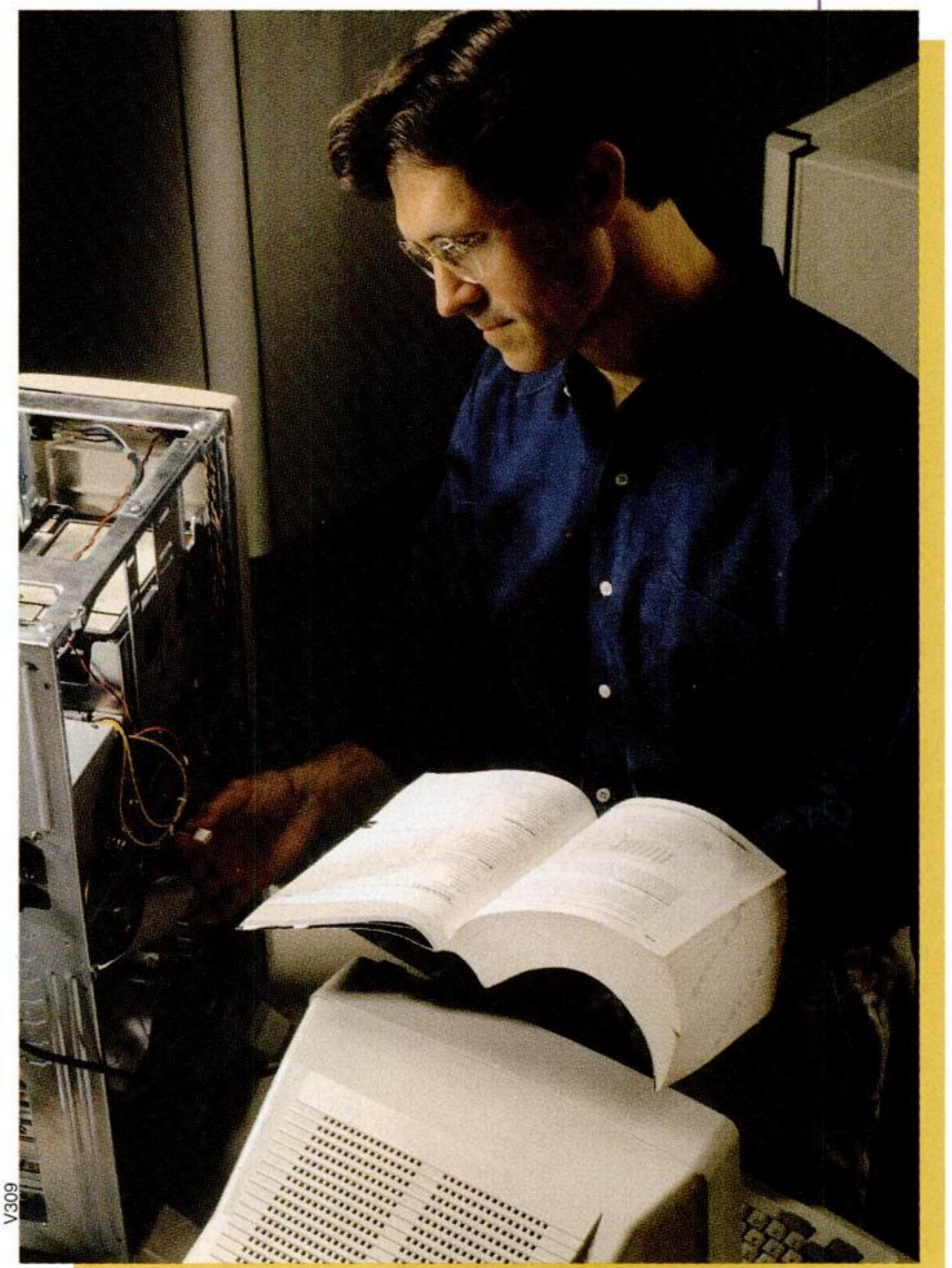

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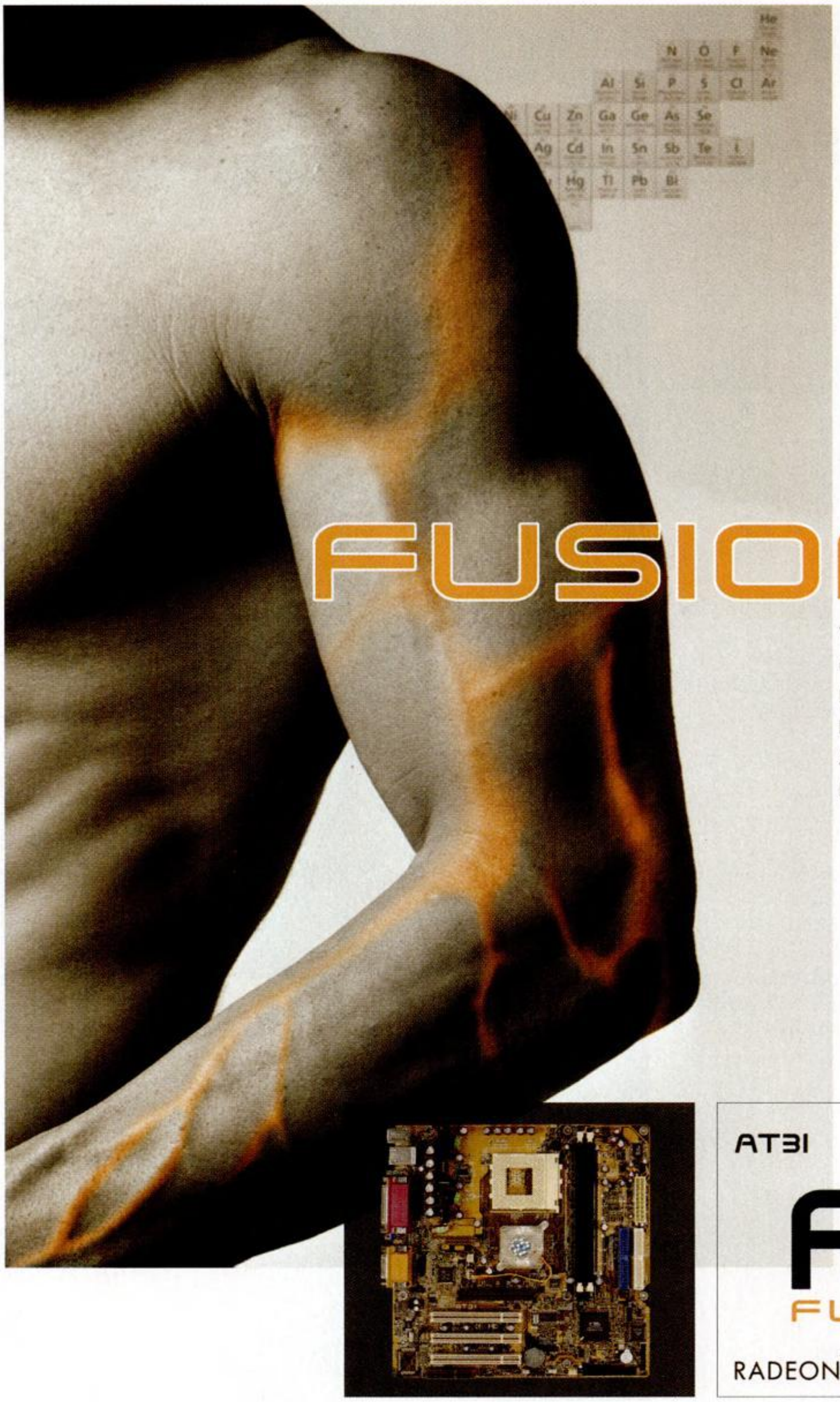

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FUSION

RADEON™ IGP 320 chipset

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Soldier of Fortune II: Double Helix

Gore galore

Look, we dig dismemberment as much as the next guy, but when a game box touts "36 damage zones and 16 dismemberment zones!" as a major feature, one does have to wonder if the developer missed the GDC seminar titled "Tips on How to Avoid Congressional Hearings." The original *Soldier of Fortune* made its mark two years ago as The Game Your Mother Warned You About. An almost unbelievable level of sadism turned a routine first-person shooter into a visceral, gut-churning experience. Beneath the entrail-crusted surface, however, *SoF* was a pretty run-of-the-mill FPS with middling level design and sloppy programming unworthy of Raven, one of the best FPS development teams in the biz.

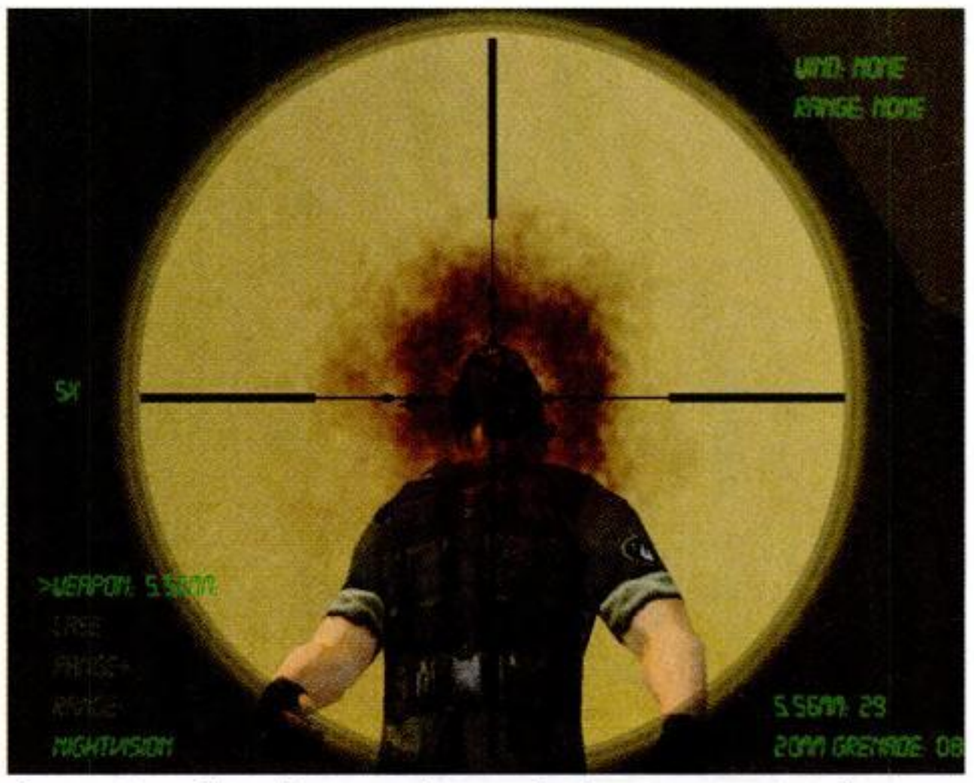
Soldier of Fortune II: Double Helix does a lot more of the same, only much prettier. Raven has fitted the *Quake III* engine with their "Ghoul II" technology, which increases the realism of character models and allows you to blow away just about any piece of anatomy with a level of gore that would make George A. Romero blush.

Beyond that, however, there isn't all that much to sustain one's interest over the game's 10 missions. Level design ranges from decent to poor. The game often channels you through buildings on a predetermined route using locked doors that can be unlocked from only one side, resulting in some maddeningly linear levels. It also makes for some absurd Winchester Mansion–style locations, such as a hotel where portions of a floor are inaccessible except from *other* floors. Level loading is fast enough, but pops you out to a "loading" screen for each new section of a level. This happens dozens of times, utterly disrupting the pace.

The entire experience is a real mixed bag. The arsenal of weapons is a nice collection of real-world guns and grenades, but nothing really surprising. Weapon modeling seems right-on, with a variety of reload times, recoil, accuracy, and stopping power paired with good hit modeling. As for realism, it's closer to *Counter-Strike* than it is to *Ghost Recon*, but that's still pretty good. With its solid capture-the-flag and infiltration modes, it could have displaced *Counter-Strike* as a popular multiplayer game if it offered a wide array of great MP maps, which it doesn't.

Gore is the name of the game. Few games put the human body through such hell.

The problem lies in the action itself, which has several fatal flaws aside from middling level design. First, there is a deplorable Stealth element added to certain missions without any rhyme or reason. In these portions, merely being seen by an enemy for even a nanosecond triggers an alarm. In *Jedi Outcast* (also developed by Raven) or *Medal of Honor*, an enemy would have to *actively* raise an alarm, not merely beam alarmish-type thoughts to everyone else on the level using mental telepathy.



A pretty effective random mission generator is included to roll out quick missions, so you can get right down to blowin' off heads, which is what *SoF II* does best.

Second, the game uses some cheap AI cheats, such as tall grass that hides an enemy but not you, and bad guys equipped with some kind of newfangled Homing Grenades that always hit their mark. On the positive side, enemies move and use cover while shooting.

The plot is a boilerplate affair about mercenary John F. Mullins tracking down chemical weapons in exotic locales around the world: the jungles of Columbia, streets of Prague, a drug-dealer's house, a ship, the docks, and other places full of boxes. Narrative is conveyed with protracted, sleep-inducing cutscenes and interminable, unskippable in-game yak-yak from people who *just won't shut up*.

It's almost impossible to believe that the same people who made *SoF II* also brought us *Jedi Outcast* and *Elite Force*. Everything that was right with those games—event scripting, level design, AI, narrative—is just OK in *Soldier of Fortune II*. After the first couple missions, you begin to get the feeling that nothing really special is ahead except for more of the same, and you're right. The single-player portion bogs down in redundancy, with new locations breaking the monotony only momentarily. As a straightforward run-'n'-gun game, it works fine, but after *Jedi Outcast*, *Medal of Honor*, and even *Wolfenstein*, it just doesn't carry the water. Ultimately, the gameplay is what *Rogue Spear* would have been if the Red Storm team had said, "Ahhhh, f*** it. No one cares about realism and tactics. Let's work on volumetric arterial sprays."

—THOMAS L MCDONALD

MAXIMUM PC VERDICT

Soldier of Fortune II: Double Helix
ACTIVISION

+ GOOD OLD-FASHIONED ASS-WHUPPING

Sixteen ways to dismember a body, because 17 would have just been *sick*. Excellent character modeling and a breakneck pace.

– POKE IN THE EYE WITH A BLUNT STICK

Linear and repetitive levels, cheap AI cheats, and old-school FPS run-'n'-gun gameplay.

www.activision.com
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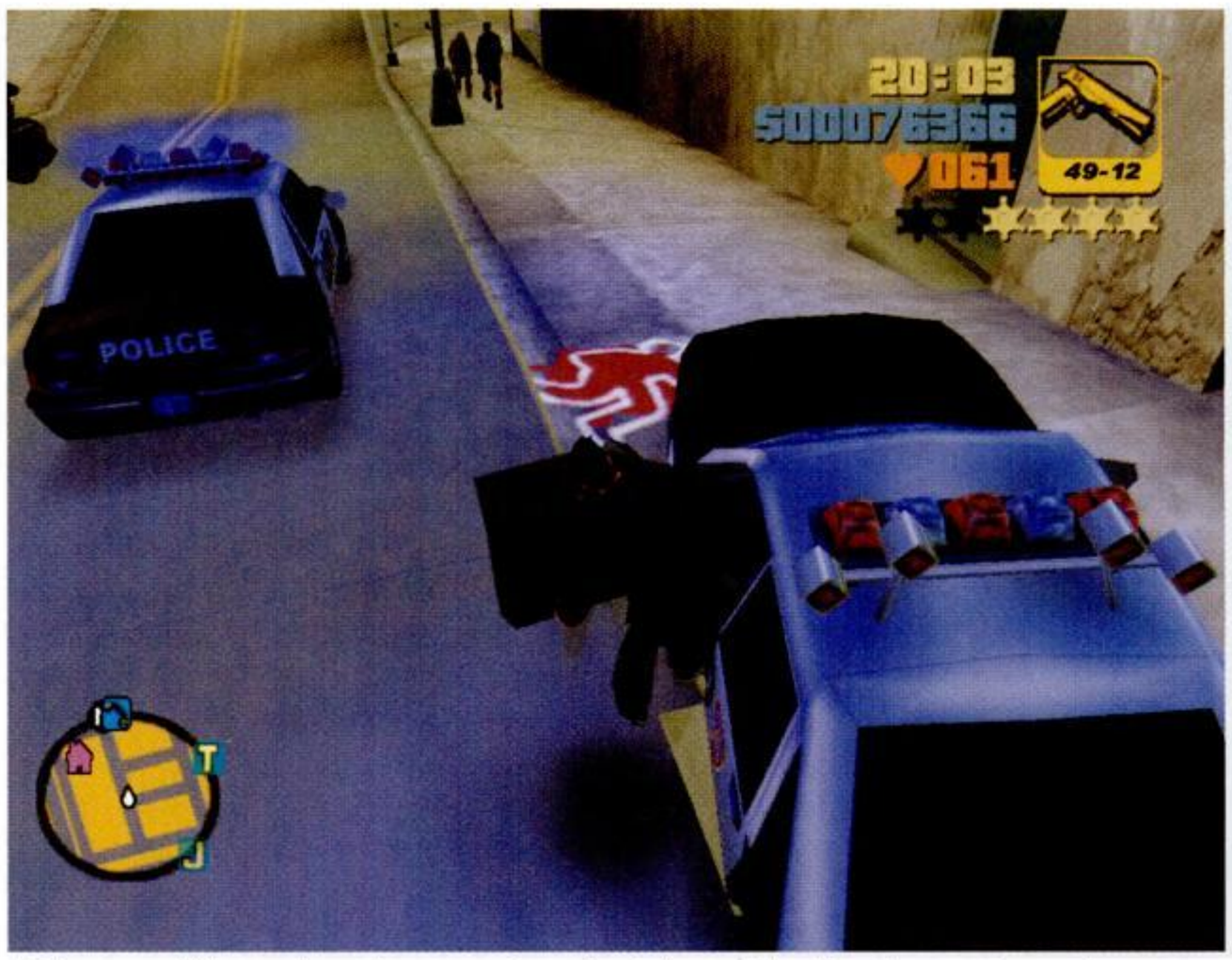
Grand Theft Auto 3

Good old American ultra-violence—this time done right



After mauling a few innocent pedestrians, the best way to make a quick escape is to jack the first police car on the scene.

Sometimes developers create a game that's so insanely violent, every reactionary politico from Jesse Helms to Hillary Clinton shows up on the cable news circuit to protest the mayhem. Unfortunately, the games they complain about usually suck ass.

So you can imagine how surprised we were when we fired up *Grand Theft Auto 3* and found a truly fun game that's so chock-full of violence, it would make even the inmates from "Oz" fall to the ground crying for their mommies.

If you've never played a *GTA* series game before, it might be impossible to prepare yourself for what you'll encounter in *GTA3*, where you assume the role of a two-bit car-jacker in Liberty City. When the game begins, you're armed with just your fists and Old Smashy, your trusty Louisville Slugger. When you emerge from your hideout, you'll need to "find" a new set of wheels. In Liberty City, this is as easy as picking out a car, plucking the driver from his seat, beating the crap out of him (at your violent discretion, of course), and hopping in behind the wheel.

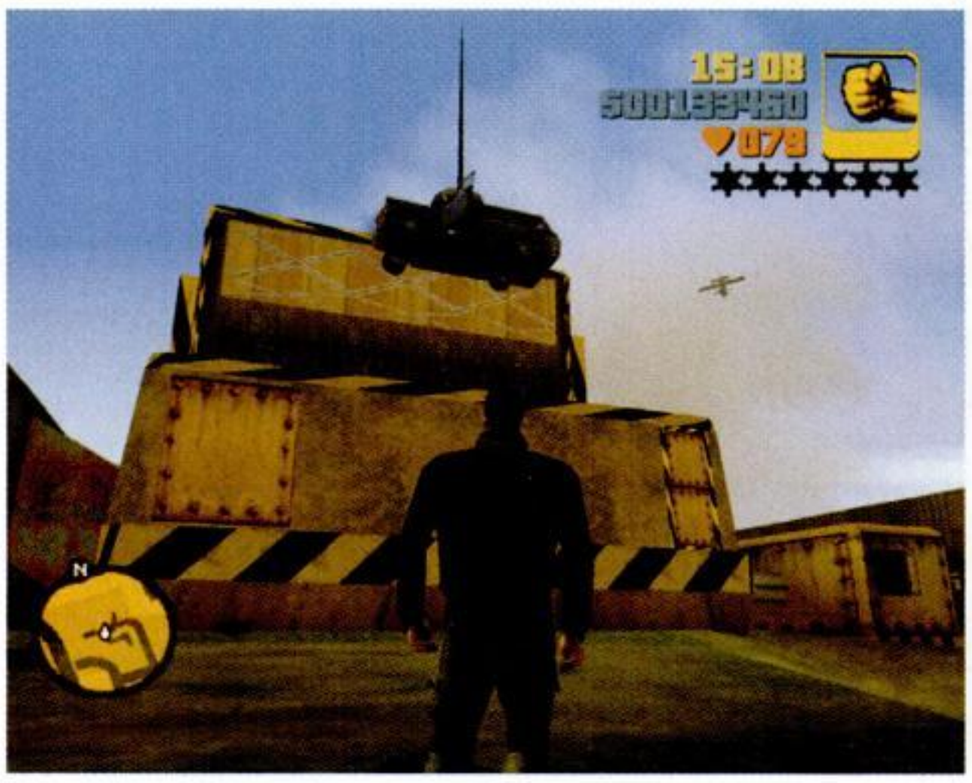
Once the novelty of the all the bloodshed wears off—10 minutes for most people, probably—you'll begin to truly appreciate the beauty of the game's design. After the first mission is complete, you roam around the city and do whatever you want. If you want to jack a new car and head over to the local kingpin's hideout to see if he has any work for you, you can do that. If you want to nab a cab, and drive around picking up and dropping off fares, you can do that too. Just want to make a quick buck? Mugging hookers is both profitable and easy. What we have here is an open-ended game that's a blast to explore—something we can't say for most nonlinear environments.

You advance in the game by completing missions assigned by high-profile criminal scum. Sure, you can make cash by completing sub-missions in the taxicab, firetruck, or ambulance, or even by performing driving stunts on the ramps scattered throughout the city. But to unlock the other two "islands" in *GTA3*, you need to complete missions.

The huge city is vast, detailed, and lively, mostly due to the dynamic interaction of its inhabitants—we were especially impressed when we turned a corner to find Triad thugs in a shootout with Mafia types. Even though we weren't involved in the battle, they continued fighting! But the real stars of the game are the missions, which can range from simple "pick up and drop off" jobs, to complex assassinations, to flat-out street races, and most can be accomplished any way you like. If you're charged with eliminating a dozen Triad vans, you can either snag a late-model American road machine and engage in a high-speed chase before running the vans into the bay (thus attracting the attention of every cop for 30 miles), *or* you can follow the vans around, and give the drivers a hot lead injection in a quiet alley, totally unbeknownst to John Q. Law. Need to stop a baddie from escaping? Instead of spending 10 minutes chasing him through the city, you can park a garbage truck in front of his getaway car, then casually saunter up and introduce him to your 12-gauge shotgun.

Despite tiring early of all the carnage, we were captivated by *GTA3's* dynamic storyline and massive world. This is a game that anyone can pick up and be comfortable with in a half hour, but not master without many hours of playtime. Assuming you can stomach the horrific level of violence, there's not a new game on store shelves that you'll enjoy more.

—WILL SMITH



Need to pick up a new car? Leave your last one burning in the street! If you need to ditch some incriminating evidence, head to the car crusher!

MAXIMUMPC VERDICT

Grand Theft Auto 3
TAKE 2 INTERACTIVE

+ ASTON MARTIN VANQUISH

Seemingly simple, yet startlingly deep—it might be the perfect open-ended game. The keyboard and mouse are especially well-suited to gameplay.

– FORD COUNTRY SQUIRE

Poor graphics leave no doubt that this is a console port. Some of our systems had a problem with nVidia graphics chipsets in WinXP.

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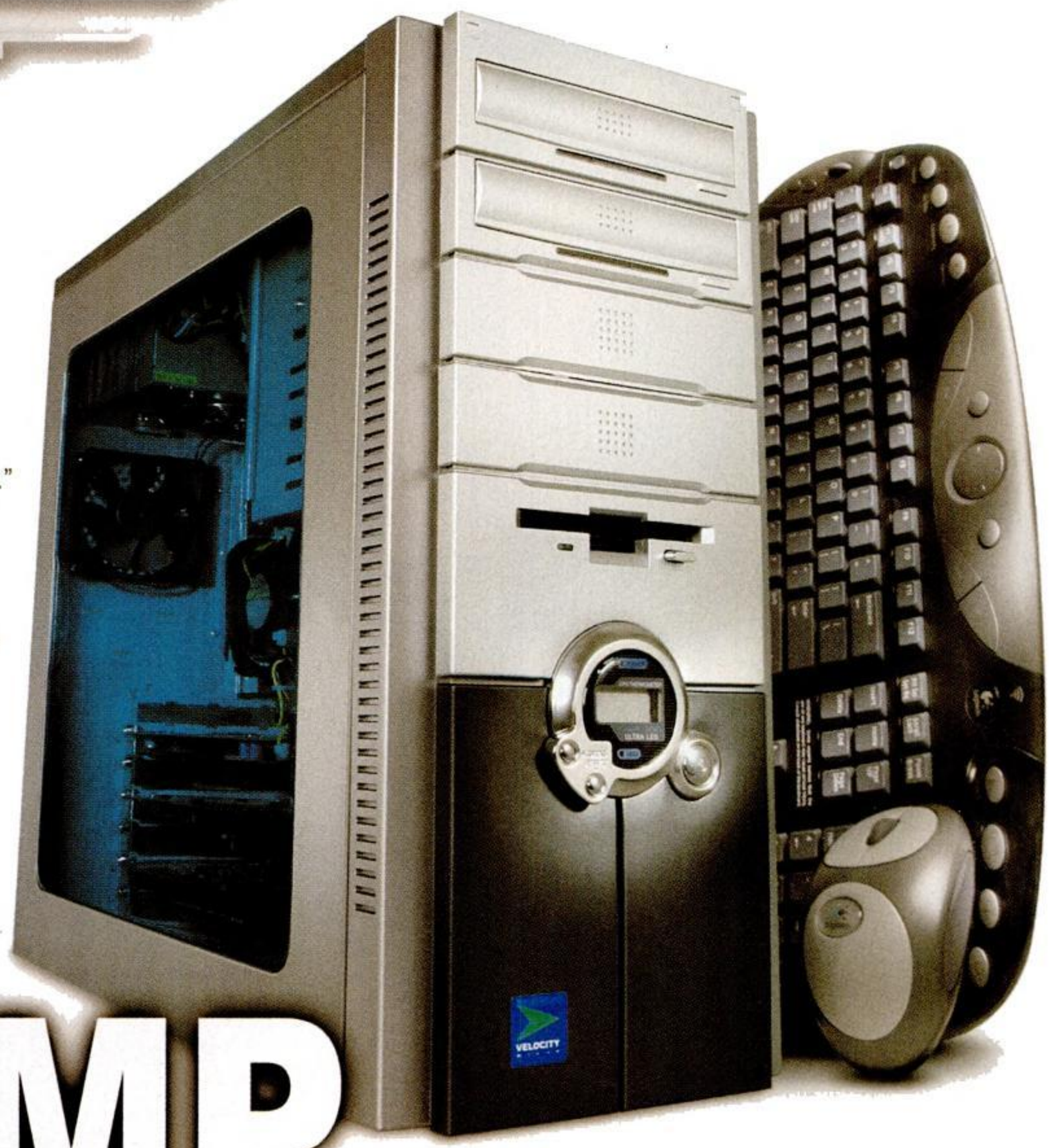

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MPC0802

PC Mods

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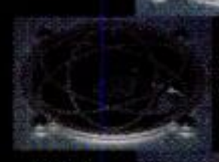
92mm $19
120mm $22

Biohazard
80mm $18
92mm $20
120mm $24



Atomic
80mm $17
92mm $19
120mm $22

Swirl
80mm $19
92mm $22
120mm $25

Standard Grills

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ThorTek	92mm	$7
ThorTek	120mm	$8

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Sunon	60mm	$9
Sunon	80mm	$13
Sunon	92mm	$17
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Thermaltake DRAGON ORB 3 AMD Athlon 1.5GHz+
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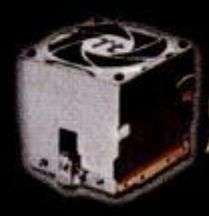

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Part# 90007

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*Quantispeed™ architecture operates at 1.533 GHz
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Western Digital 40 GB 7200rpm Hard Drive
Lite-On 32x12x40 CD-RW with Software
1.44 MB 3.5" Floppy Drive
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Microsoft Windows XP Home Edition
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Part# 90331

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SOYO SY-KT333 Dragon Ultra Raid DDR MB
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*Quantispeed™ architecture operates at 1.67 GHz
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Sony 16x DVD, 40x CD-ROM
1.44 MB 3.5" Floppy Drive
Creative Labs Live 5.1 Sound Card
VisionTek Xtasy GeForce4 Ti4200 128 MB Video
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AMD Athlon™ XP 2200+ Processor
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*Quantispeed™ architecture operates at 1.8 GHz
Dynatron DY1206BH-610 Heatsink Fans
512 MB 2700 CAS 2 DDR Corsair Memory
Western Digital 1000 JB SE 8MB Cache 7200rpm HD
Lite-On 16x DVD 40x CD-ROM
Lite-On 40x12x48 CD-RW with Software (Optional)
1.44 MB 3.5" Floppy Drive
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Lian-Li Clear Side Panel for PC60	$ 45
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Abit KG7 266FSB DDR	$79
AMD 266 FSB Socket A	$ 55-79
AMD VIA KT 333+	$ 69-149
Asus A7V 333 DDR 266 RAID	$125
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Tyan Dual MPX Socket A	$169-350

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AMD Athlon™ XP 1800+		$94
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ATI Fire GL 8700 64MB AGP	$289
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Leadtek GeForce4 Ti4200 64MB AGP	$163
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*Quantispeed™ architecture outperforms competitive 2.0 GHz processors
*Quantispeed™ architecture operates at 1.67 GHz
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The Monarch BFG 1800

Part # 90750

$1099.00

Monarch Custom Tower W/350W PS
Gigabyte GA-7VRXP RAID DDR MB
AMD Athlon™ XP 1800+ Processor
with Quantispeed™ Architecture
*Quantispeed™ architecture outperforms competitive 1.8 GHz processors
*Quantispeed™ architecture operates at 1.533 GHz
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Lite-On 40x12x40 CD-RW (Optional)
1.44 MB 3.5" Floppy Drive
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VisionTek Xtasy GeForce4 Ti4200 128MB AGP
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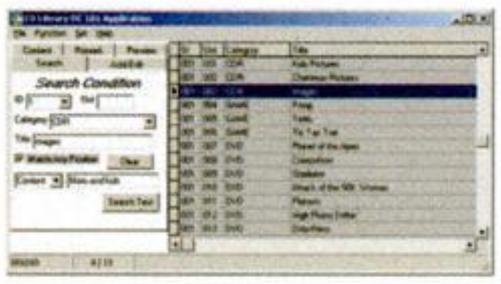

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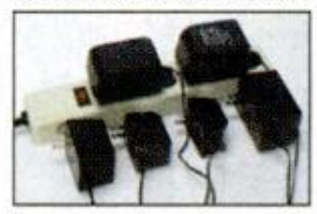

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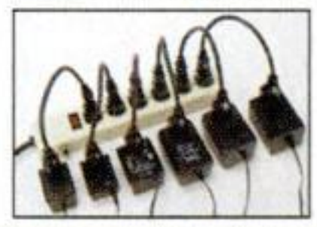

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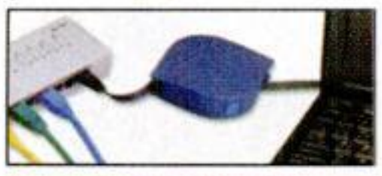

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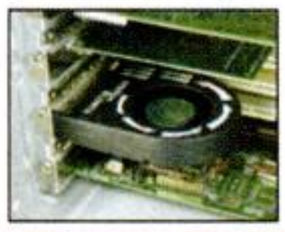

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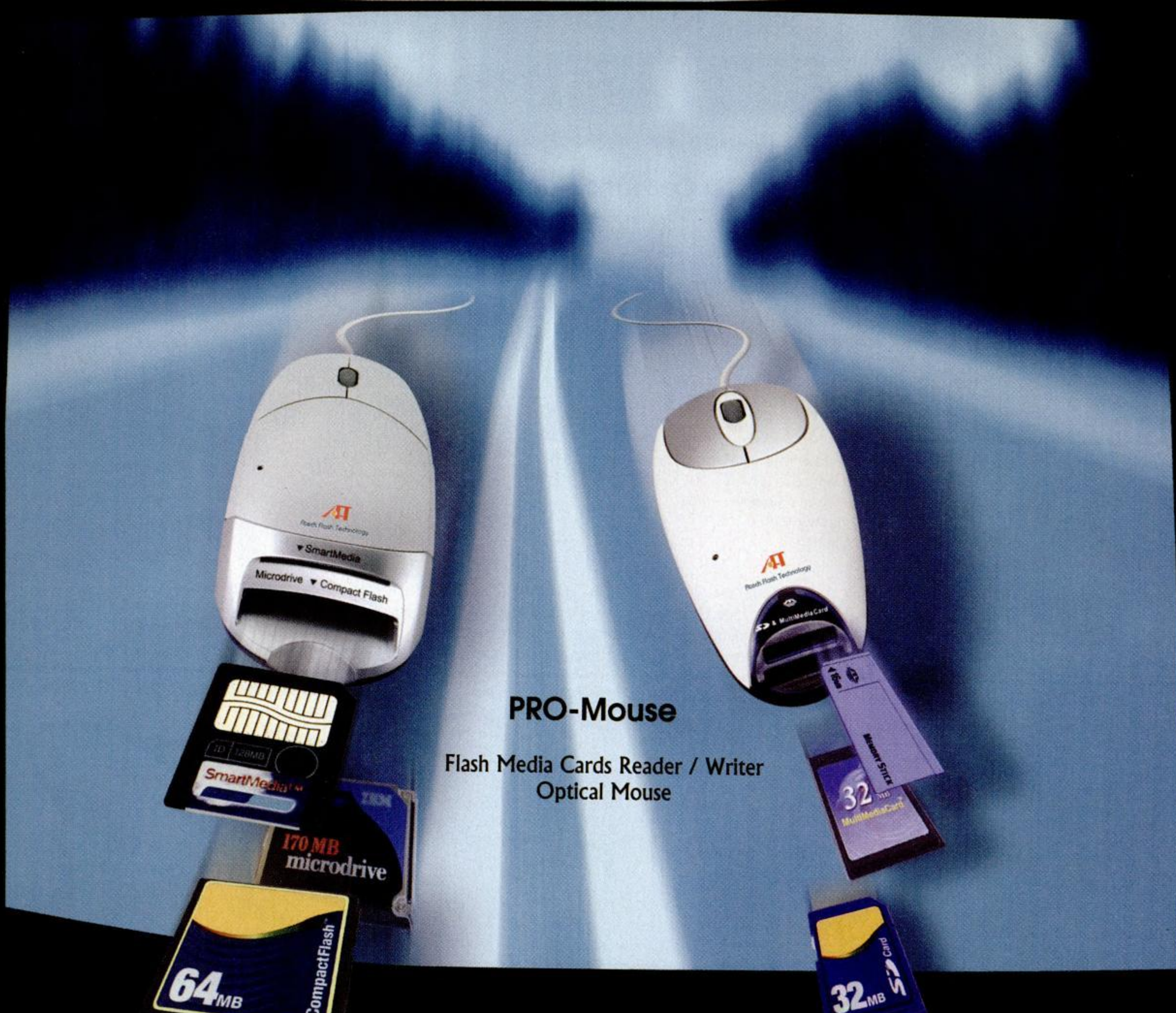

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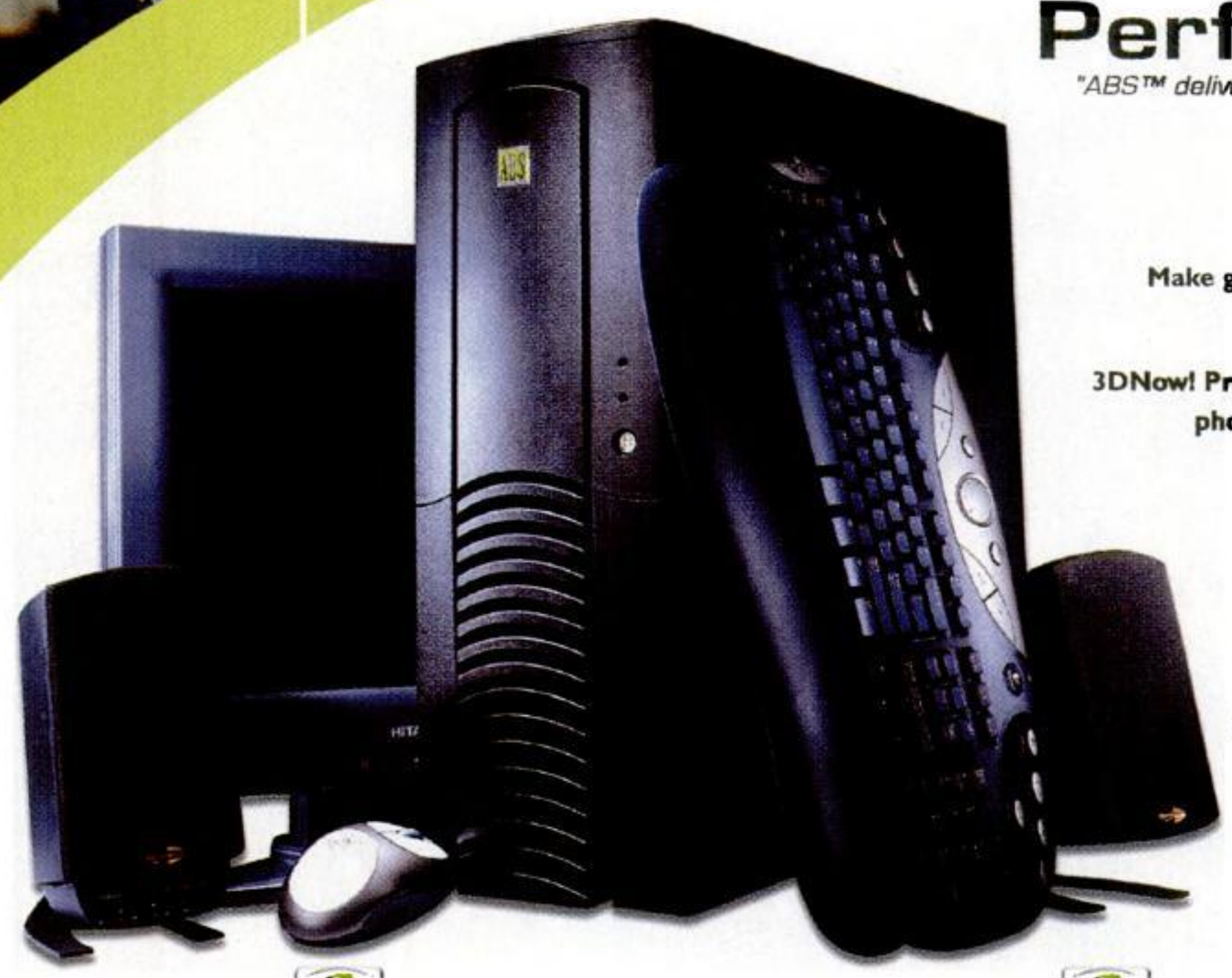

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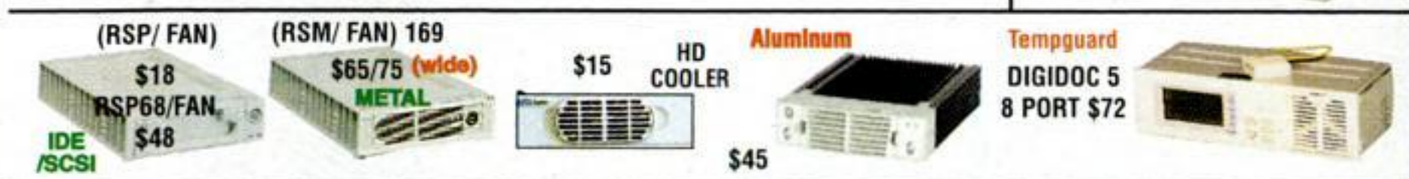

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MODEL/ SPECS	Bare Bone	Dimension W.D.H	I/O ports	5.25"	3.5"	PCI	PCI ISA
105LPX socket 370	255	12x13x3.1	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO, GAME	1	1/1	3	or 0
105LPX TV	275	12x13x3.1	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME,TV	1		3	or 0
107S37	395	5.75x6.2x1.9	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME	1slim	0/1slim	0	0
111M.NLX 370	260	11.5x10.6x2.5	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO, GAME,1394	w/slim CD	0/2.5 HD	2	or 0
192 M.ATX 370	185	13.8x16.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME	1	1/1	3	or 0
192B M.ATX 370	185	13.8x16.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME	1	1/1	3	& 0

Case Specification & Price List

Model	Price	Dimension W.D.H.	MB Size	5.25 Ext./Int.	3.5 Ext./Int.	P.S.
R02/BARE	180/300	19x17.6x3.5	M.ATX	1/0	1/1	150W
R04B/W	275	19x24.3x3.5	ATX	1/0	1/3	250W
R05B	430	19x242x3.5	ATX	1/0	1/4	430W
R06B	250	19x20.2x5.25	ATX	4/0	1/5	300W
R08 B/W	1550/1800	19x22x3.5				
R14 B/W	215	19x21x7	ATX	3/0	1/3	300W
R15	295/510	19x24.4x7	ATX	6/0	2/2	300W
R16 B/W	225	19x18x7	ATX	3/0	1/2	250W
R17 B 4U	215	19x21x7	ATX	3/0	1/2	250W
R20 B/W	275	19x20.5x7		8/0		300W
R21 B/W	275	19x18x7		8/0		300W
R26R/B/W	630/850	19x22.6x10.7	ATX	4/0	2/4	300W/R
R28	290	19x17x8.7		8/0		300W
RSP	18	5.8x9.3x1.6			1	
RSM169-100	65/75	5.8x9.3x1.6			1	
001B	75	10x11.5x3		1/0		60W
001B1	65	8.3x10.6x2.8		1/0		50W
002B	88	6.9x14.6x5.8		2/0		60W
002B1	78	7.5x11.2x6.5		2/0		80W
004B	105	6.8x15.3x9.3		4/0		230W
004B1	100	7.5x17.3x10.2		4/0		200W
007B	180	7x15.8x13		7/0		250W
008B	280	8.4x20.2x18.3		8/0		300W
008B1	180	7.5x17.9x17.1		8/0		250W
105LPX/TV	255/275	11.9x12.6x3	LPX	1/0	1/1	90W
107 bare	395	5.75x6.2x1.9			1slim/00/1slim	
111N bare	260	11.6x10.6x2.5	M.NLX	1/0	0/1	100W
192M ATX/B	85	13.1x16.5x3.5	M.ATX	1/0	1/1	150W
224	75	17.4x18.8x6.1	ATX	3/0	2/2	230W
267	70	16.8x16.8x6.2	ATX	2/0	2/1	250W
271	85	17.3x15.9x5.5	ATX	2/0	1/1	250X
288	75	16.9x17x6	ATX	3/0	2/1	230W
304	70	7.9x18.8x13.9	ATX	3/0	2/1	300W
325B	55	8x18.5x17	ATX	3/0	2/1	235W
338	55	7x14.7x13.8	M. ATX	2/0	2/1	145W
366	50	7.2x15.5x14.3	M. ATX	2/0	1/1	235W
367	55	7.7x16.5x17	ATX	3/0	2/1	235W
370	80	8.3x17.3x16.1	ATX	3/0	2/2	250W
392	80	7.5x17x17	ATX	3/0	2/2	250W
393	90	9x17.5x17.5	ATX	6/0	1/1	250W
401	110	8.5x17.3x18	ATX	2/0	2/2	250W
404	105	8x18.8x17	ATX	4/0	2/2	320W
405B	75	7.8x17.5x17.2	ATX	4/0	2/2	320W
409	295	9.5x22x18.1	ATX	4/0	2/5	300W
411	67	7.2x17.2x16.8	ATX	4/0	2/1	250W
412	67	7.2x17.2x16.8	ATX	4/0	1/2	250W
413BL	67	8.5x19.5x18	ATX	4/0	2/1	250W
415	75	8.8x19.5x19.7	ATX	8/0	1/0	300W
418B/W	115	8.1x18.8x21.4	ATX	4/0	2/4	300W
422	70	7.7x16.6x18.1	AT	4/0	1/4	250W
424	70	7.5x18.9x16.7	ATX	4/0	2/1	250W
426B/W/S	70/75	7.5x17.5x19.3	ATX	3/0	2/2	250W
427	75	7.5x16.5x17.3	ATX	3/0	2/2	250W
430 BL/BK	220	8.25x19.75x18	ATX	4/0	3/6	300W
436	70/85	8.6x18x15.6	ATX	3/0	2/2	250/300W
443	75	8x18.8x17	ATX	4/0	2/2	300W
467	75/90	7.5x16.7x18.8	ATX	3/0	1/4	250W/300W
470	110	8.3x17.3x21.3	ATX	4/1	1/2	250W
471	110	8.4x17.5x21.3	ATX	3/1	1/4	250W
472	60	7.5x18x17.6	ATX	4/0	2/2	250W
474	285	7.8x17.2x17.2	ATX	4/0	2/2	300W
476	70	8x17.2x17	ATX	4/0	2/2	300W
477BL	75	8.75x17.5x17	ATX	4/0	2/2	300W
478	155	7.9x18.4x16.4	ATX	4/0	2/1	300W
480	195	7.8x18x16.5	ATX	4/0	2/1	300W
482B	80	7.8x19.8x17.5	ATX	4/0	2/2	250W
486	67	9.6x19.5x17	ATX	4/0	2/1	250W
487B/W	105	8.25x18.4x21.25	ATX	4/0	2/4	300W
489**	80	7.3x17x17	ATX	3/0	1/2	235W
492	229	8.3x19.5x17.6	ATX	4/0	3/5	300W
493B	234	8.3x19.5x17.6	ATX	4/0	3/5	300W
494	229	8.3x19.5x17.6	ATX	4/0	3/5	300W
496	60	8.25x17.8x16.5	ATX	4/0	1/3	250W
501	155	8.25x17.2x23.8	ATX	4/0	2/4	300W
503R/B	455	14.8x20.4x18.4	ATX	8/0	2/4	300RW
503/B	295	14.8x20.4x18.4	ATX	8/0	2/4	300W
505	555	14.6x23x26.8	ATX	12/0	1/8	300W
505R	670	14.6x23x26.8	ATX	12/0	1/8	300RW
518	145	8.1x18.5x26.5	ATX	6/0	2/6	300W
524	380	13.9x25.6x19.1	ATX	7/0	1/2	300RW
526B/W	105/120	7.5x17.5x24.5	ATX	6/0	1/4	250W/300W
528	95/110	7.5x16.5x24.8	ATX	6/0	1/5	250W/300W
536	93/108	7.8x17x24	ATX	5/0	1/5	250W/300W
560/R	290/445	15x24.5x23.5	ATX	11/0	2/4	300W/300R
562/R/B/W	250/470	8.7x17.9x26.8	ATX	9/1	1/0	300W/300R
563/RB/W	145/370	8.7x17.9x26.8	ATX	10/0		300W/300R
565	185	9.25x18.3x21.2	XEON/ATX	4/0	2/4	300W
569B/W	210	13.5x17.8x14	B/ATX	6/2	0/8	300W/300W
570/R	150/370	8.3x17.3x26.4	ATX	7/1	1/2	300W/300R
571/R	160/370	8.3x17.3x26.4	ATX	6/1	1/2	300W/300R
582	105/120	7.8x16.5x23.2	ATX	6/0	2/1	250W/300W
588	99/114	7.8x16.5x23.3	ATX	5/0	1/3	250W/300W
592	315	8.2x23.5x23.5	ATX	6/0	3/6	300W
1620/R	950	16.5x20.3x34.3	F/ATXx2	16/0		300R

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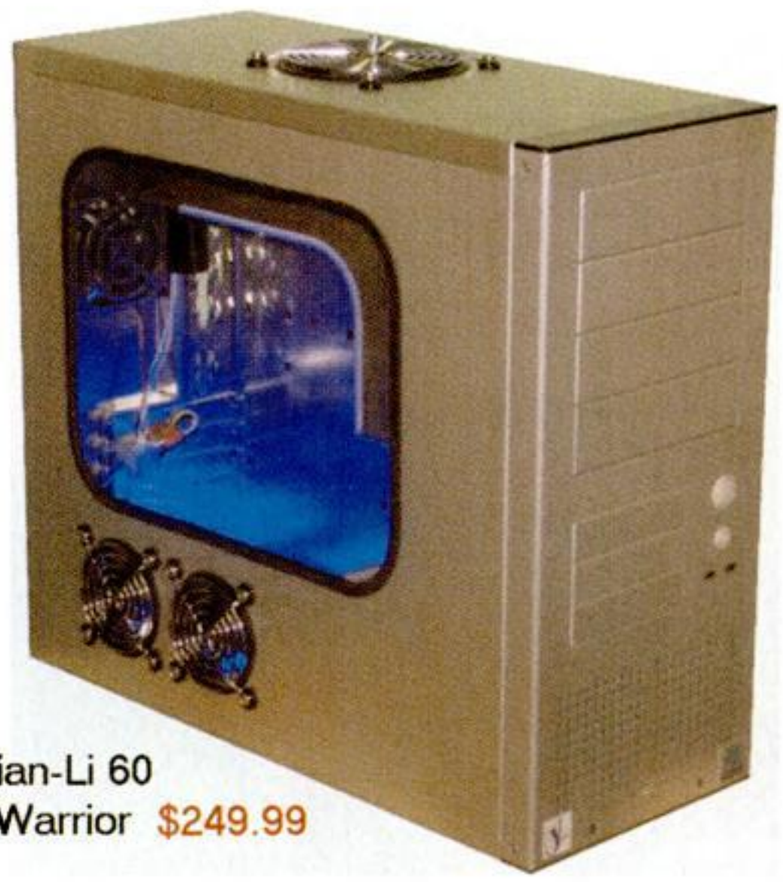

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MAXIMUMPC Rig of the Month

THIS MONTH: Yoshi's Boxx

We like playing games just as much as the next geek, but we'll be the first to admit that our playing habits pale in comparison to the preoccupation, nay, *passion* for games exhibited by Yoshi DeHerrera. In a mad fit of hardware-hacking freakiness, Yoshi equipped his custom rig with no fewer than *six* gaming systems. Think about it: An Atari 2600, Nintendo Entertainment System, Microsoft Xbox, Nintendo GameCube, Sony PlayStation 2, and good-old PC—all in one compact configuration. We first set eyes on the Boxx at the Screen Savers web site (www.techtv.com/screensavers). Here's what we learned when we talked to Yoshi himself.

Shoot, with all these gaming systems at his disposal, it's a wonder that Yoshi ever leaves the house.

MPC How long did the mod job take?
The total time from beginning to end was three months. A good deal of that was spent waiting for parts and figuring out how to make everything work.

MPC What unexpected difficulties did you encounter?
The switch I was going to use for the A/V was a DACT audio switch. I was going to use two of them, but I couldn't even get one. It's made by a Danish company that has only one U.S. distributor, and they were less than helpful.

MPC Did all the systems work on the first go?
Hee hee—that's a good one. No. The Atari does not like going through the ATI videocard's TV tuner. So I'm modding the Atari to output a composite video signal. I'm also planning on using a GeForce4 videocard in place of the ATI, as the only reason I chose the ATI was for the TV tuner.

MPC What are the power requirements?
All the power comes through one cable. The individual systems are then tied into a power distribution block. As I don't play all of the games simultaneously, it hasn't posed a problem. I've left all the systems on at once to check for possible heat problems, and found none.

No Room at the inn:
So how does Yoshi get all this gaming goodness to come out on one monitor? Simple. He uses a six-position, nine-pin serial switch box, through which all the composite, audio, and video streams are channeled. All images are processed through an ATI All-in-Wonder videocard.

MPC Which system do you find yourself turning to the most?
I play the Xbox and PS2 mostly. The other systems are mostly played by other people that have not seen the system yet, and get nostalgic about the Atari and 8-bit Nintendo. It's not so much that I play them all constantly, its just nice to be able to play whatever I want. ■

If you have a contender for Rig of the Month, e-mail **input@maximumpc.com** with pics and a brief write-up.

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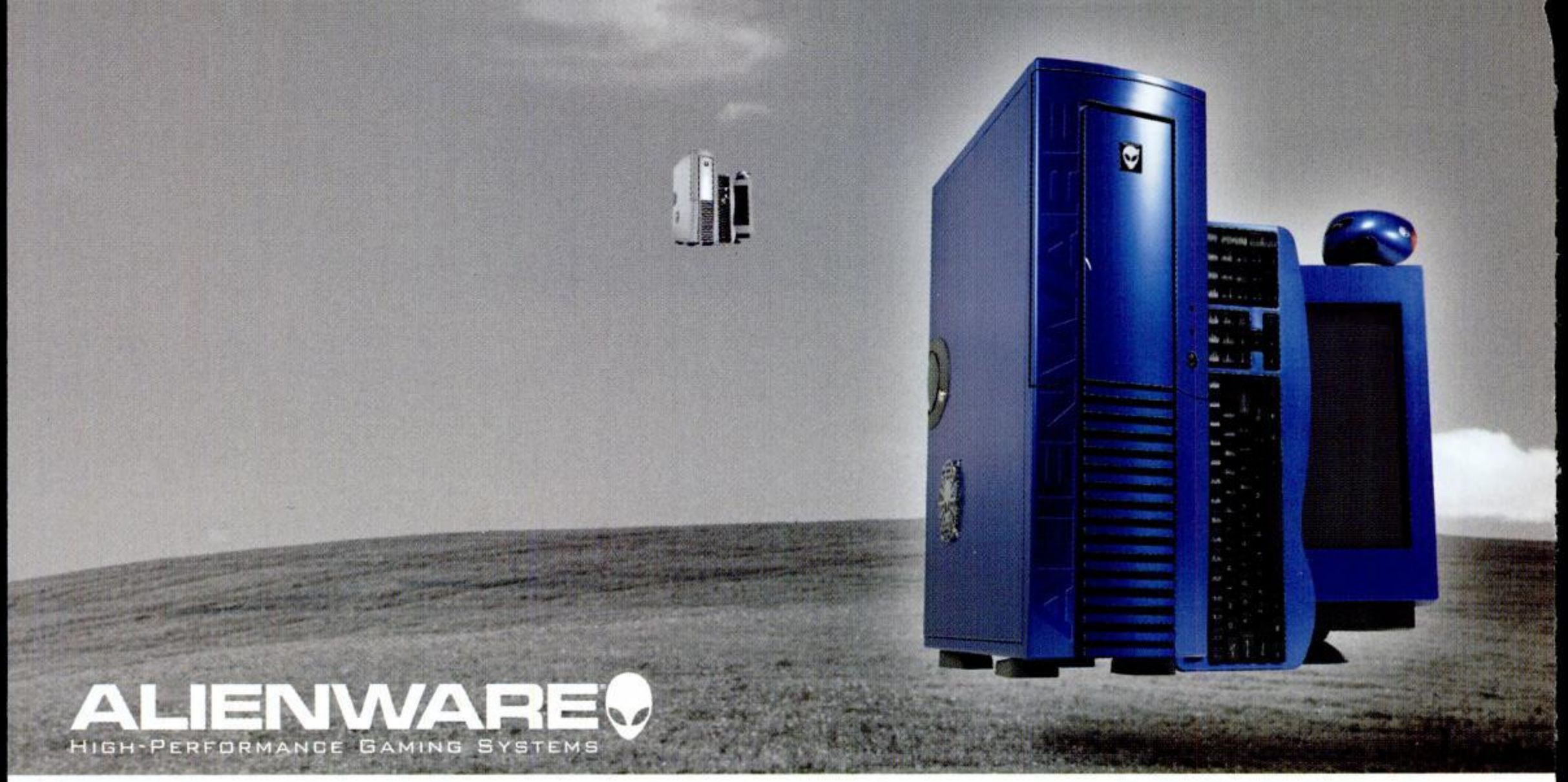

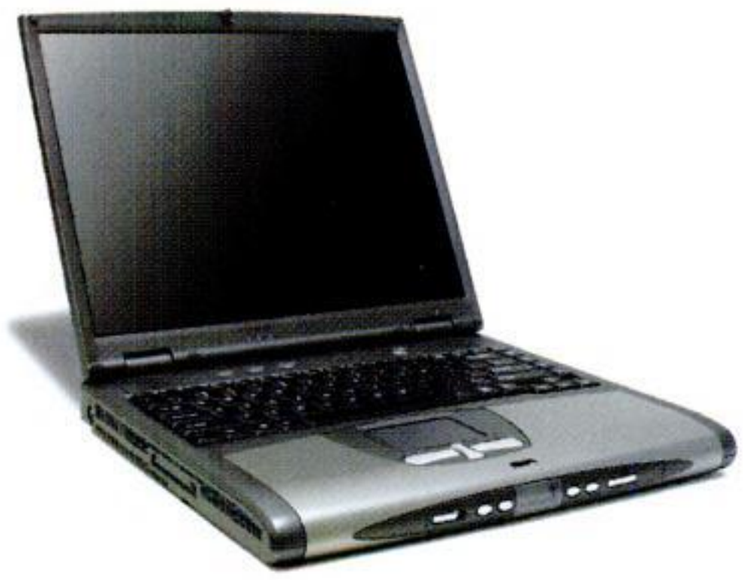

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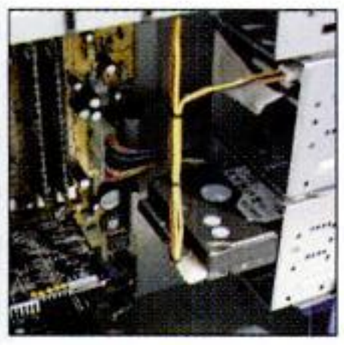

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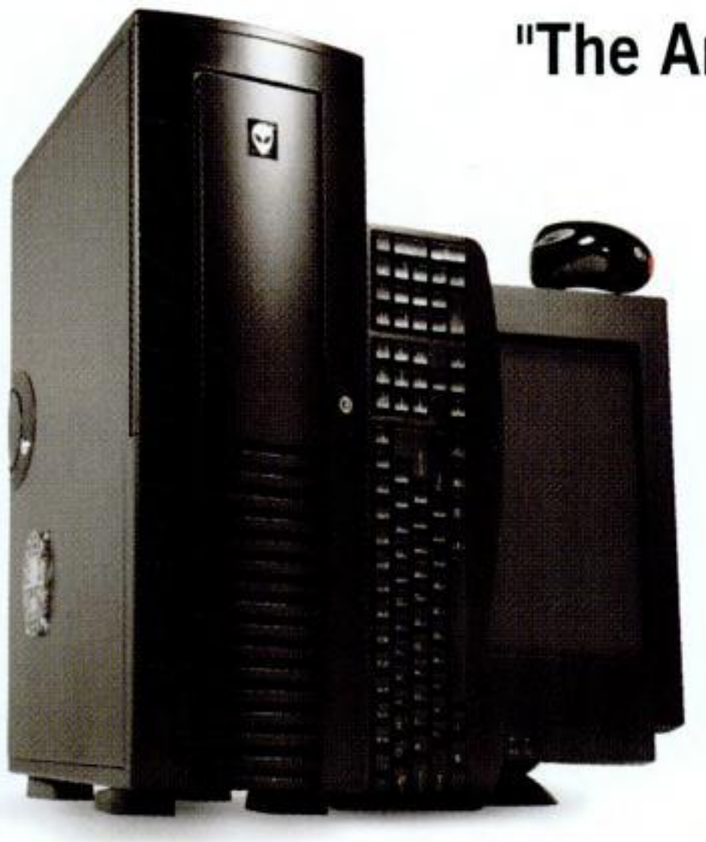

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